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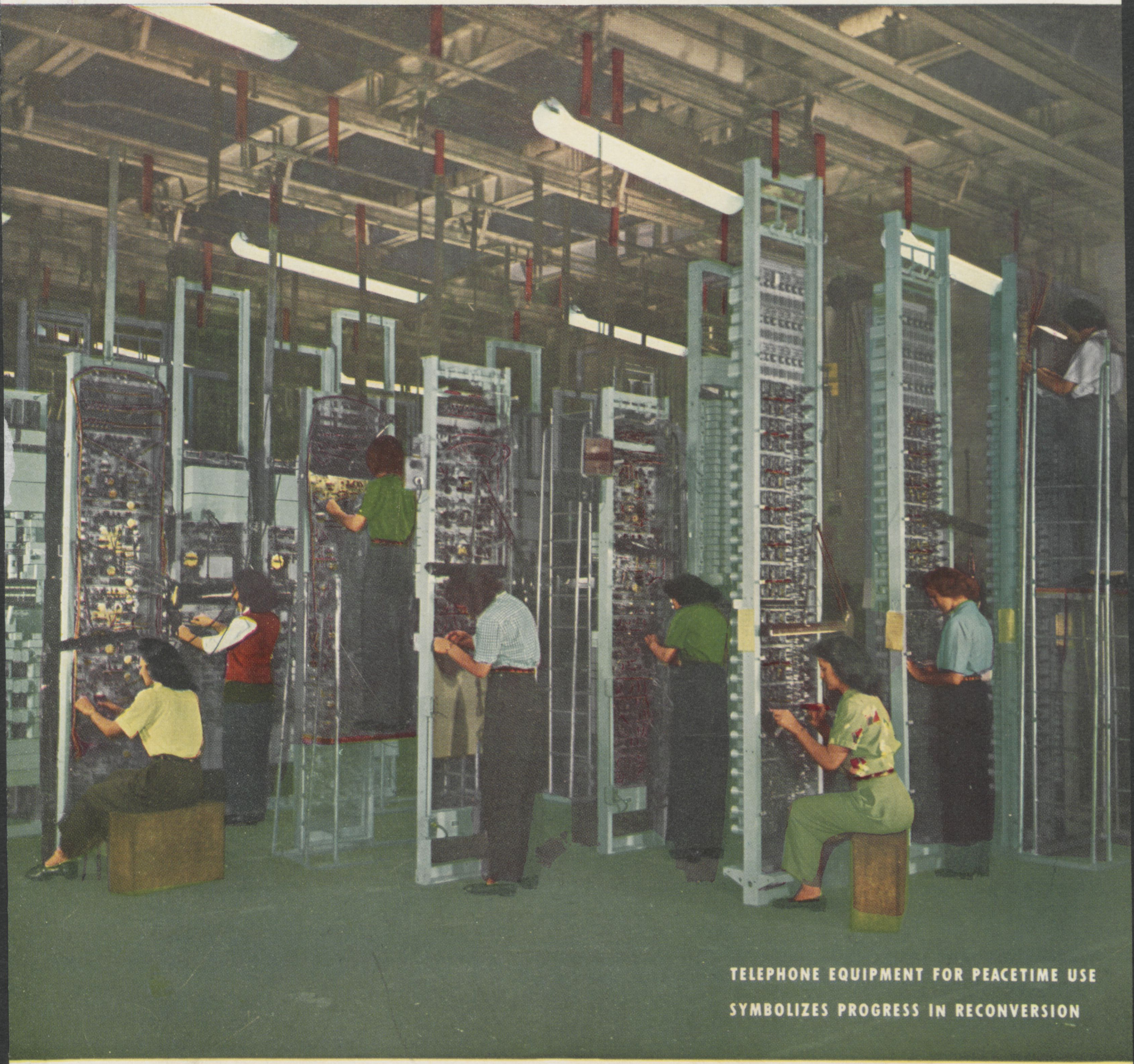
Rose Technic Staff
Rose-Hulman Institute of Technology

ROSE TECHNIC



FEBRUARY, 1947

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

OPERATION: **Can Manufacturing**

HEATING APPLICATIONS:

- **Joint Preheating**
- **Seam Soldering**
- **Enamel Coating**
- **Lithograph Drying**

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Labor-saving automatic controls, clean and pleasant working conditions, availability and dependability of supply make GAS the preferred fuel for all process heating.

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THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE ROSE TECHNIC

VOLUME LXII, NO. 6 FEBRUARY, 1947

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Arkansas Engineer, Cincinnati Cooperative Engineer, Colorado Engineer, Cornell Engineer, Drexel Technical Journal, Illinois Technograph, Iowa Engineer, Iowa Transit, Kansas Engineer, Kansas State Engineer, Kentucky Engineer, Marquette Engineer, Michigan Technic, Minnesota Technolog, Missouri Shamrock, Nebraska Blueprint, New York University Quadrangle, Ohio State Engineer, Oklahoma State Engineer, Penn State Engineer, Pennsylvania Triangle, Purdue Engineer, Rose Technic, Tech Engineering News, Wayne Engineer, Wisconsin Engineer.

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COVER

Western Electric communication equipment on the assembly line.

—Cuts Courtesy **Factory Management and Maintenance**

FRONTISPIECE

This striking view of a huge steam turbine during assembly shows the rotor just before installation of the upper housing.

—Cut Courtesy **Westinghouse**

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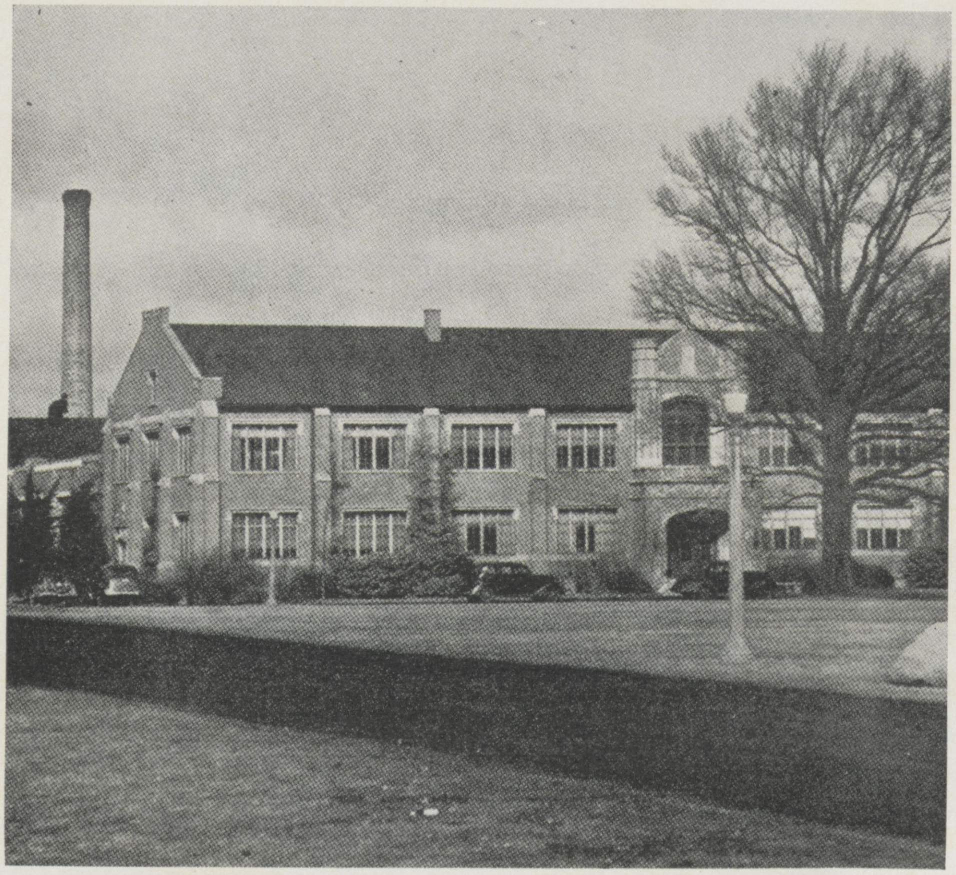


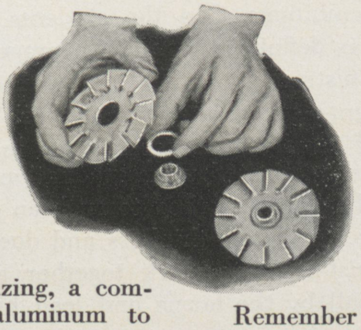
The next freshman class will be admitted to Rose on June 30.

Students with advanced standing may be admitted at the beginning of any term provided there are vacancies in the classes for which they are eligible.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, IND.

ALUMINUM BRAZING—
another victory of Alcoa Research



Problem: How to join a stamped aluminum fan blade to a machined aluminum bushing to make a fan for portable electric tools.
Answer: Assemble the two parts with a special aluminum alloy ring in between and put them in a furnace. The ring melts and joins the parts together solidly.

This is an example of furnace brazing, a comparatively new way of joining aluminum to aluminum. It is another of the ways in which Alcoa Research has made aluminum more useful and more economical to fabricate.

Alcoa metallurgists first had to find an aluminum alloy that would melt at lower temperature than the aluminum parts it was to join. Then, in order to get a direct metal-to-metal bond, they had to find a way to disperse the thin film of oxide that covers aluminum.

Finding a low-melting alloy was relatively simple. But it took years of persistent research to produce a mixture of chemicals that melted with this brazing metal and removed the oxide film. The discovery of this flux made brazing practicable.

Such discoveries are not unusual when Imagination teams up with Engineering. At Alcoa we call it *Imagineering*.

Remember that—*aluminum can be brazed*. Someday it may be the answer to your *own* design or fabricating problems.

Remember, too, that the best place to turn for answers to any problem about aluminum is the place where the most research has been done on this strong, light, versatile metal . . . the place where there is the most knowledge about its use. Turn to Alcoa.

Aluminum Company of America, Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

America - Fit To Lead?

AMERICA is now emerging from the depths of a great war. At the conclusion of this struggle she was naturally looked upon as a leader, a beacon to light the road to lasting peace. However, in the few short months following, the light has dimmed and the pathfinder herself is stumbling aimlessly along the highway. Whether she is to continue this journey can be answered only by her pilots, the 140,000,000 people who will chart the future travels.

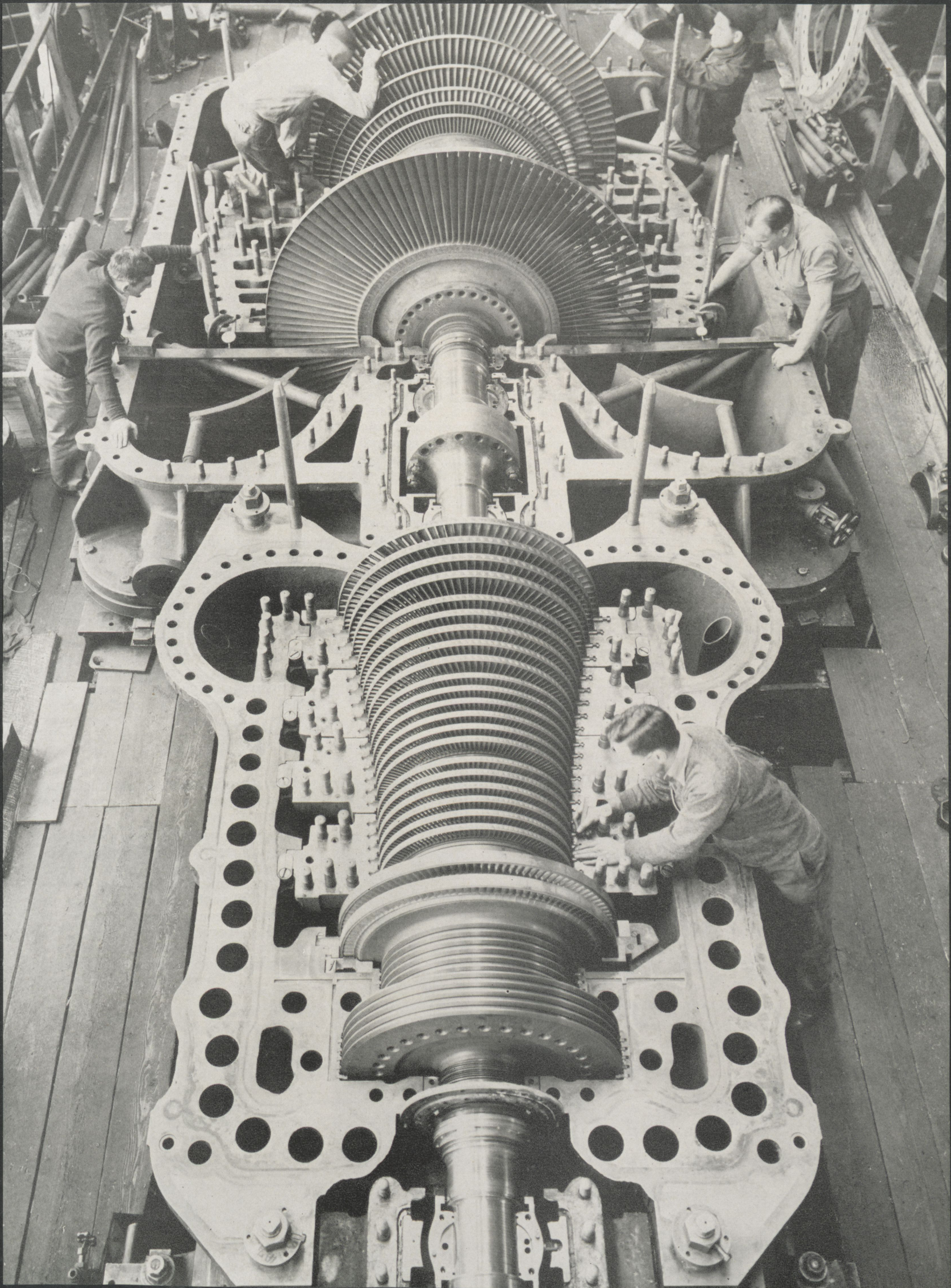
American diplomats have been attempting to show the world concrete examples of democracy; to prove this type of government is the sure way to world peace. But, as unruly children behind the parent's back, the American people have defeated every opportunity and consequently are rapidly becoming the laughing stock of the world. How can we convince the world that democracy is the most satisfactory government when in our own midst petty quarrels, labor difficulties, and unstable business risks are working in opposition to this principle. America should not attempt to lead the world until she has settled her own troubles, those which are striking at the very heart of a sound government.

From what does this internal turmoil stem? It might well be attributed to a feeling of financial insecurity, but from every indication the real answer lies in individual greed and distrust. We cannot expect cooperation on a national basis, when small factions are unable to mend differences and assume an attitude of aiding rather than hindering progress toward national unity.

The aftermath of war has left its effects on American youth. The returning veterans entered school with fresh, vigorous ideas, but in a short time an attitude of complacency replaced these ambitions. Can the students be blamed entirely for this sudden change? The answer is definitely, no! The average student, though not actively engaged in government administration, watched with anticipation through newspapers and periodicals his government's progress toward peace. The consistent blundering accompanying the settlement of important issues has led many careful thinkers to hesitate. Just what future can be anticipated upon graduation? Why complete an education at all? Individual initiative has been curbed to such an extent that we are beginning to resemble a nation of robots, automatic thinkers and doers. We must cease this groping in the wilderness; we must learn to work together again, pool our energies and resources so as to take the bull by the horns and lead him back to the greener pastures of prosperity.

How else can we think and act as a nation until this general clean-up has been accomplished? By all means, to lead the world through this dangerous post-war period, America must first give ample proof that she is capable of handling her own problems. Then, and only then will she be a fit leader, a beacon for other countries to follow.

John R. White



Chemicals From The Sea

By Karl Hauser, fresh.

All photographs courtesy of Dow Chemical Co.

It is significant that a time when the world is being warned against depletion of its metallic resources, exploitation of a seemingly limitless natural resource is just beginning. That this resource, sea water, should be so long neglected is remarkable, for oceans cover 71 per cent of the earth's surface and have been one of the dominant factors in the development of civilization.

From the beginning of recorded history the seas have played an important part, serving as both an aid and a barrier to progress. Yet until comparatively recent years no chemical exploration had been pursued. The first comprehensive analysis of ocean water was made by Dittmar in 1884 on 77 samples taken on a round the world trip of the *HMS Challenger*.

More than 30 elements were found by Dittmar in his analysis, and recent work has brought the total to 50. It is generally assumed that all known elements are present in sea water, but some in quantities too minute to be detected. Dittmar's analysis also showed that the composition of sea water is virtually constant the world over.

There are two hypotheses which attempt to explain how these elements came to be present in sea water. The most common is that over millions of years these elements have been washed down by the rivers into the oceans where they have become more concentrated. Weak points in this explanation give rise to the second hypothesis—that the ocean has always had its present composition, having acquired its chemical composition from volcanic gases at the time the earth's crust cooled.

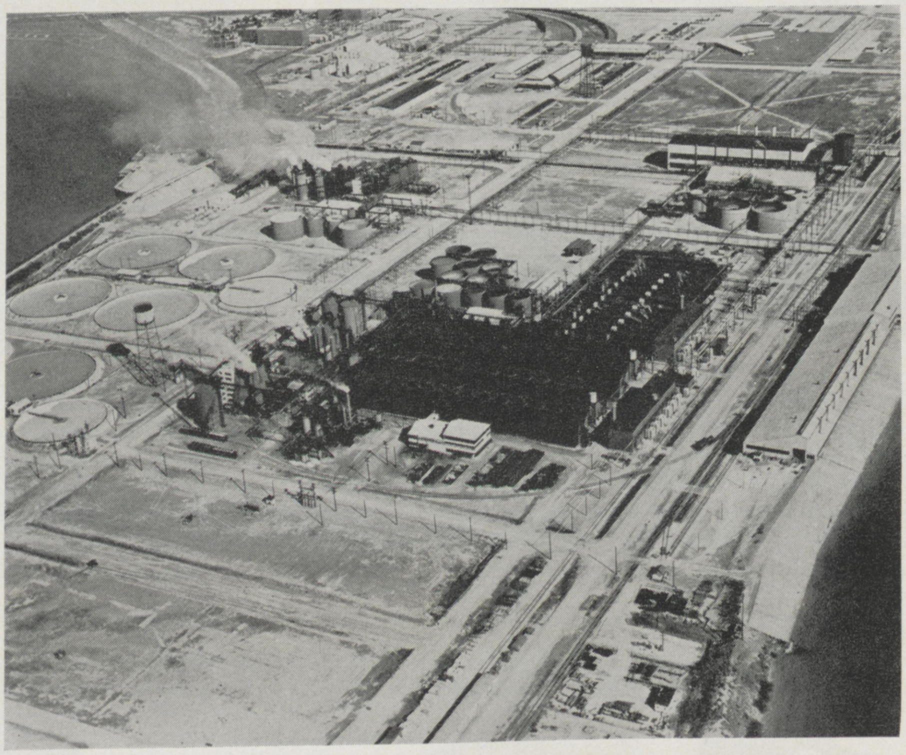
The only elements contained in sea water in significant concentrations are chlorine, sodium, magnesium, calcium, potassium, bromine, boron, and fluorine, chiefly as various soluble salts. These range, in order, from chlorine at 19,000 parts per million, to fluorine at 1.4 parts per million.

The notable exception to the failure to exploit these resources from sea water is the extraction of common salt. Use of salt goes back to the beginning of recorded history, and probably beyond. From the beginning of salt making, its extraction from ocean water has been chiefly by solar epaporation. Evaporation by direct heat is possible, but most of the world's sea water salt industry is in areas where the climate is favorable for solar evaporation. Although some refinements have been introduced, the basic principle has remained the same—letting ocean water into broad shallow basins where the salt crystallizes after evaporation of the water.

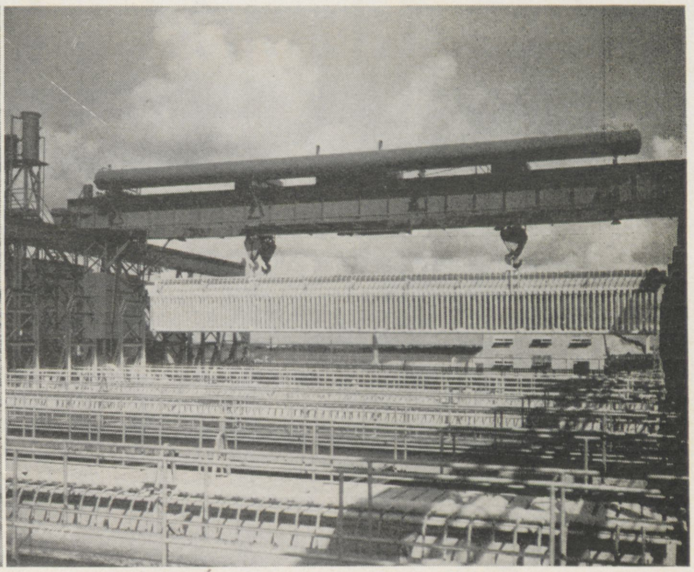
Although extensive work in extraction of elements and compounds from natural brines had been done, utilization of the ocean's resources began only after other scientific developments had provided a demand for them. In 1924 came the first attempt to reclaim commercial quantities of an element directly from the ocean entirely by chemical processes.

This element, bromine, had been found to be necessary in the antiknock treatment of gasoline in the compound ethylene dioromide. At that time the annual production of bromine in the United States was 2 million pounds, a quantity insufficient to meet the growing demand. This demand was anticipated by chemists, who in 1924 began looking for new sources to supplement the inadequate existing ones.

Since sea water represented an unlimited supply, it was seriously considered as a potential source, even though bromine is found to the extent of 70 parts per million. Two attempts at bromine extraction by the Ethyl corporation were made, but due to production costs, the venture was abandoned. Chemists of the Dow Chemical Company who had perfected a process for obtaining bromine from the natural brines at Midland, Michigan, became interested in the possibility of using a similar process on sea water. The essentials of this basic process were: oxidizing the brine with chlorine to liberate the bromine, removing the free bromine from solution by sparging with air, and absorbing the bromine from the air with an alkali carbonate solution, from which it was separated in commercial form.



Dow magnesium plant at Freeport, Texas.

Left: Tons of oyster shells arrive at the sea water plants where they will be used in production of magnesium hydrate. Right: Precipitated magnesium hydrate is filtered out of sea water by means of these Moore filters.

Due to the fact that sea water contains about one-twentieth the amount of bromine found in natural brines, modifications of this process were made, the most important of which was pH adjustment with acid. Pilot plant operation effectively demonstrated that 50% of the bromine in sea water could be separated as pure liquid at a satisfactorily low operating cost.

Having established a process, the Dow Company undertook to find a suitable site for operations. The requisites for such a site were:

1. The sea water at the site selected should not be diluted by fresh water streams.
2. Location should allow easy disposal of effluent without diluting the water entering the process.
3. There should be no appreciable quantities of industrial waste in the water.

In 1931 a pilot plant was erected on the selected site, Kure Beach—a peninsula near the mouth of the Cape Fear river in North Carolina. Extraction reached 500 pounds of bromine daily, and experience gained in this project helped in designing the commercial plant.

In 1933 the Ethyl-Dow Chemical Company was incorporated, and in a short while, production of 15,000 pounds of bromine per day was accomplished in the new Kure Beach plant. This was the first commercially profitable extraction of an element from sea water.

More than just the successful extraction of an element from sea water was accomplished, for the foundation was laid for exploitation of the world's most extensive natural resource. It was then logical to assume that other elements and compounds could profitably be extracted from the ocean, and the Dow Chemical Company already had a favorable answer in the lightest structural metal—magnesium.

Dow had first become interested in magnesium during World War I, when the demand was chiefly for use in flares and other pyrotechnics. Within a short while after the end of the war, the market was so small that all companies except Dow ceased magnesium production. In the ensuing years, Dow continually improved its magnesium process, which consisted basically of the electrolytic reduction of magnesium chloride obtained from the Midland, Michigan, natural brines. At the same time magnesium alloys were being developed, and Dow attempted to convince industry of their value as structural materials but with little success.

Had it not been for World War II, magnesium might still occupy an unimportant spot among structural materials. Use in airplane construction and incendiary products suddenly jumped U. S. production from 9 million pounds in 1940 to almost 600 million pounds per year at the end of the war. Although its use in airplane structures has made industry conscious of its possibilities, it has had little use in manufacture of peace-time products, and so the peacetime market is smaller than the peak wartime production.

In 1940, magnesium demand was such that Dow planned expansion to a capacity of 24 million pounds per year. Since only one-half of this could be extracted at Midland, Dow looked to the ocean as the best possible source for the remaining 12 million pounds.

In addition to the three requisites for a sea water processing site which were listed in connection with the Kure Beach bromine plant, it was necessary to have sources of cheap power and limestone, and adequate facilities for rail and water transportation. An almost ideal site was found at Freeport, Texas, on a narrow peninsula which juts into Freeport Harbor.

Using valuable experience gained in the bromine project, the magnesium plant was quickly constructed, and on January 21, 1941, the first commercial ingot of metal ever extracted from the sea was poured. War needs soon afterward made expansion necessary, and more extraction plants were constructed. By March, 1942, nearly 300 million pounds per year were being produced by the Dow process.

This process, as developed for use in the Freeport plant, consists of the following steps:

1. Precipitation of the magnesium hydroxide from sea water using milk of lime made from oyster shells.
2. Conversion of the precipitate after filtration into magnesium chloride, using hydrochloric acid.
3. Concentration of solution in direct-fired evaporators and dehydration in shelf and rotary driers.
4. Electrolysis of the flaked an-

(*Continued on Page* 24)

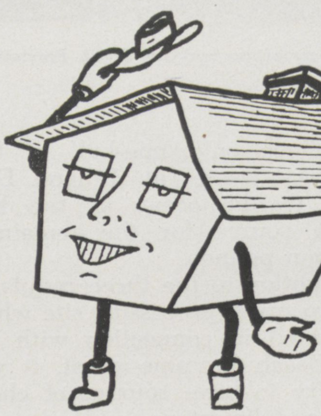
Electricty In The Home

By Robert Briggs, jr., e.e.

Hello Folks:

This story is about my family's nervous system and the complaints that we have with respect to its misuse and inadequacy for our modern duties. Oh, I forgot! I believe that you people refer to our nervous systems as our electrical wiring.

In order to prevent any future misunderstandings, perhaps I had better clarify certain terms that I will be using throughout my story. I have told you about our nervous



systems. In many ways our nerves are just like yours. The are subject to shocks and overloads just as yours are. A continuous strain can result in a partial or complete breakdown and in some cases may cause death.

We have nerve centers just as you do, and nerve controls. You recognize these centers as junction or fuse boxes, and the controls as switches and circuit breakers. Our individual nerves are circuits in your language, and they may have feeders and tributaries supplying and draining off the nervous energy.

Naturally, we must have a source for this nervous energy. It is usually supplied by a centralized power plant. The energy generated at the power plant is sent along distribution nerves to a point near our location, and then other wiring (the service entry) brings it through a measuring device and into our main control center.

This measuring device, known as a kilowatt-hour meter, keeps count of how many units of energy we consume. Actually, the basic unit is the watt, and you will find that all of the electrical appliances you use will have a name plate stating how many watts each appliance will use. As an example, if a hand iron marked 1000 watts is used for one hour, one kilowatt hour of electrical energy would be used. Now that we have the nomenclature straight, I will get on with my story.

The first application of electrical energy to our every day tasks began in the late 1800's. At that time very little was known of our new form of energy, and it was used mainly for lighting. It was very poor light at that, but a marvelous improvement over the old style gas mantle. Many of the members of my family were completely unaware of our newly found capacity, and only our rich city relatives were able to experience the thrill of using our new power.

Since the discovery of our system, specialists have offered a continuous stream of services and appliances using its power. Today many of our masters and mistresses recognize our electrical network as the most versatile service that we can offer.

Our main trouble is that only a few of the people, with whom we Homes are associated, understand the characteristics of our nervous system. As a result, our nerves are often heavily taxed. Naturally, these jolts cause a dangerous temperature rise, and force our efficiency of operation way down.

We Homes do have a distinct advantage over human beings in that our nervous systems can be planned before we are ever created. Furthermore, our systems may be modernized or rejuvenated regardless of our age.

These facts make it even more shameful that so many of our occupants do not take advantage of the opportunity offered and plan their needs before our electrical wiring is installed. This means that we are frequently handicapped in serving our masters by not having a sufficient number of circuits properly designed to fulfill his desires. We have suffered many a profane outburst for breakdowns which our masters caused but blamed on us.

I think that you will all agree that we have a right to complain about the abuse that our electrical wiring has suffered when I tell you about a few of my relatives.

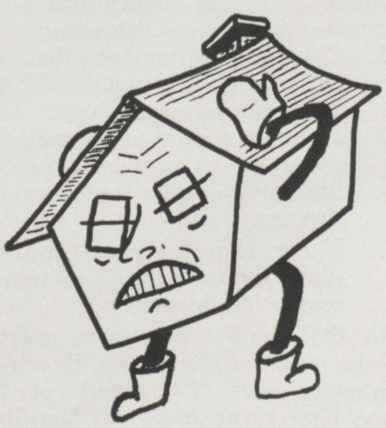
In 1944, 600,000 members of my family in the United States died or were injured by fires. Of these fires, 70,500 had an electrical origin. In other words, 11.75% of the fires in 1944 were caused by electricity.

If these figures do not impress you, imagine what it would be like if one out of every eight persons that you met in one years time had suffered from a nervous breakdown.

These losses not only cause my family a lot of grief, but they also cost you a lot of money. The 600,000 fires in 1944 cost $456,000,000, and of this figure $53,580,000 was attributed to electrical fires.

In 1945 there were approximately 78,000 electrical fires, or an increase of 7,500 fires in one years time. Of the 78,000 fires, 47,000 were caused by misuse or faulty wiring and equipment amounting to an estimated $36,000,000 loss, and the remaining 31,000 fires were caused by power consuming appliances. We might conclude from these figures that 60% of the electrical fires in 1945 might have been avoided if our occupants had known a little more about our nervous systems.

Another alarming condition exists that has a direct effect upon you people. Are you aware of the ap-



palling figures of eye defects in the United States? About one person in every five of the entire population wears corrective glasses. This means that 25,000,000 inhabitants of the United States are using glasses, and another 25,000,000 should be wearing glasses. This brings the total to 40% of the persons in this country that have eye defects.

Worst of all, we Homes have been able to find very meager evidence of preventative measures being taken to improve this condition. My family is really ashamed to be contributing to this program of mounting visual defects, but our hands are tied.

An abundance of light is not the correct answer. Too much light is as bad as too little. Different tasks call for various levels of light. The advised procedure is to call upon the lighting specialist of your local utility company for assistance in planning effective lighting for your home.

Perhaps you feel that an adequate wiring system is beyond your financial means at this time. This is absurd when you realize that the cost of an adequate wiring system amounts to only 2½ to 3¼ percent of the total cost of your home. Such a small percentage cannot be considered beyond your finances considering the value of the investment.

In the case of modernization, you actually cannot afford to not provide an adequate system. In 1928 our average master and mistress caused us to consume 460 annual kilowatt hours of electrical energy. By 1939 this average consumption had increased to 900 annual kilowatt hours, and today the average has jumped to 1100 annual kilowatt hours of electricity. These rapid increases in the use of electricity would seem to indicate that one of my cousins created in 1928 has a badly outdated nervous system, and is, in all probability, suffering from severe attacks of neuritis. Couple with this the fact that 65% of my relatives were created before 1926 and you can see what a sad state of affairs we are in.

But let me show you how this inadequate system affects you personally. Inadequate wiring causes the electrical pressure, pushing the current through our nerves, to drop below its normal value, and as you know,if a load becomes heavier and heavier it takes a longer time for a given pressure to move it.

The same thing happens in our case. As the load on our nerves is increased by adding more and more electrical appliances, the electrical pressure decreases and a longer time is necessary to supply the needed current. If a ten percent pressure drop should occur, which is not unusual, here are a few of the ways in which you would suffer. Lamps would give 30% less light and a sun lamp would yield only 65% of its beneficial rays. Heating appliances would give 19% less heat. This means quite a bit to you when you realize that it takes 31.5% to 60% longer to make a piece of toast. A waffle iron will take 25% longer to prepare waffles and 35% more time is needed to make coffee. Remember that you pay full cost for all of this extra power consumption.

How can you tell if you are over loading our nervous systems? Quite simply! If our lights blink when you turn on an electrical appliance, you are over loading the circuit. If we blow our fuses for no apparent reason, and the kitchen appliances seem to take forever to heat, you are probably placing our nerves under a severe strain.

There is only one cure for our overwrought nerves, and that is to modernize our wiring system. Often complete modernization is not necessary, and our taut nerves can be relieved by the addition of one or two properly planned new circuits. If you do plan this course of action, be sure to have our entire nervous system checked. Ageing of the nerve coverings over a long period of time causes a reduced safety factor, and may prove a fire hazard.

A number of steps have been taken in an attempt to promote adequate and safe electrical systems for my family. One of the first steps was taken in 1897 by a group of various insurance, electrical, and architectural organizations. This group drew up a list of rules and recommendations to be observed as a guide for the people that installed our electrical wiring and the people that manufactured the appliances to be used with our systems. This body of rules and recommendations came to be known as the National Electrical Code. The work of administering the Code was taken over by the National Fire Protection Association, and today this organization continues to sponsor this project under the rules of procedure of the American Standards Association, periodically publishing amendments and additions to the original document.

In addition to this commendable work, most of the municipal governments now require an examination of all new wiring installed. This examination must be conducted by an official usually designated by the local government, and it is required for the specific purpose of maintaining the standards of installation and safety as outlined by the local ordnances. This standard is in most cases the National Electrical Code. In this way my city relations have a second protective measure which should place their systems fairly high on the health list.

These two protective measures are fine, but they do not, in most cases, offer the protection that is necessary. This is evidenced by the high electrical mortality rate of my family that I have already quoted to you. No, something more efficient is needed.

A prolonged research has shown that the majority of electrical deaths and injuries suffered in my family tree have not been caused by bad installations, but rather have been caused by our masters placing too great a strain upon our systems. Sometimes these strains are caused by defective appliances; however, all too often they are caused by sheer ignorance on the part of the master. Lack of knowledge of the characteristics of our network! Just how can this illiteracy be eliminated? We surely couldn't have an enforced periodic inspection. That would be violating one of the basic concepts of Americanism. We can, however, educate our masters and mistresses and in this way acquaint them with the knowledge necessary to plan the electrical wiring that will be most suitable for my relative that they will be associated with. Furthermore, this knowledge will allow the people that we are serving to appreciate our capacity and not overtax our systems. By cooperating in this way, I am sure that we will be able to decrease my family's fatalities, and also enable us to offer you all much more satisfactory service.

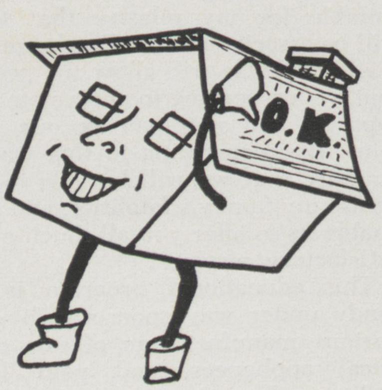
This educational program is already under way sponsored by the various manufacturers of our electrical appliances, and your local utility and service companies. Read their publications whenever the opportunity presents itself. They are written for your personal benefit as well as ours.

Throughout my entire story I have tried to show you people how desirable it is to supply my family with an adequate nervous system, and what a comfort and feeling of security it would offer you. There is, however, another point which I must make clear and that is the desirability of each of your planning the electrical wiring system which will most satisfactorily serve your individual needs. You will find that planning the electrical life of your Home family has its own living habits which demand special consideration. You are familiar with these habits and can plan what portion of our anatomy you use for each daily activity. True, it will take a specialist to plan just what size nerves are to be used and where they are to be placed; but knowing what appliances you plan to use and where they are to be located will be of immeasurable assistance to the specialist.

Secondly, by planning your own electrical service and then conferring with your contractor or architect, it will be possible to eliminate the expense of future piece wiring. Also it will enable you to do away with unsightly and dangerous extension cords by planning an electrical system sufficiently flexible to allow for future additions and rearrangements.

Thirdly by using your plan for electrical service, the architect can allow extra circuits to take care of any future expension that you might desire.

There is a fourth reason why every family should plan their own electrical needs that continues to aid my family long after you occupy one of us. In planning your electrical needs you also become acquainted with the characteristics of our nervous systems, and learn their capacities. By catering to these idiosyncracies, you will find that we are able to serve you much more efficiently.



Now then let us examine the procedure to be followed in planning a Home's nervous system. The first step should be to take a mental trip through your particular Home and list all of the electrical appliances that you plan to use. For the purpose of illustration, let us consider Cousin Cozy Home. Cousin Cozy is very fortunate in that he was designed to offer the ultimate in electrical Iiving. In all probability, you will feel that many of the appliances are beyond your personal means. If so, merely eliminate those circuits designed to serve them if a special circuit is required. If the appliance is one of several being served by a single circuit, retain the full circuit and merely eliminate the appliance from your list.

Let us start with Cozy's kitchen. This room will contain a large majority of the heavier electrical apparatus:

Range	12,000 watts
Roaster	1,650 watts
Exhaust Fan	75 watts
Dishwasher	500 watts
Refrigerator	300 watts
Toaster	1,150 watts
Radio	50 watts
Mixer	100 watts
Coffee Maker	600 watts
Garbage Disposal	350 watts
Electrical Broiler	
Waffle Iron	600 watts
Clock	3 watts
Bactericidal Lamp	

In the laundry are:

Water Heater	4,000 watts
Laundromat	375 watts
Drier	4,500 watts
Ironer	1,650 watts
Iron	1,000 watts
Exhaust Fan	75 watts
Radio	50 watts
Sewing Machine	75 watts
Clock	3 watts
Hot Plate	1,200 watts
Bactericidal Lamp	

A number of the portable appliances you will want to use in the dining room, but we will not have to consider these appliances for that room until we start planning the circuits.

In the living room, the only additional appliance will be a radio-television receiver at 500 watts.

For the bathroom we plan to install the following:

Bathroom Heater	1,000 watts
Sun Lamps	400 watts
Bactericidal Lamp	

In the bedroom our only additional appliances would be:

Electric Blankets	225 watts
Radio	50 watts
Clock	3 watts

Now lets take a look at the basement and see what appliances will be located there.

Air Cleaner	60 watts
Furnace Blower	300 watts
Furnace Control	400 watts
Cooling Unit	3,100 watts
Home Freeze	350 watts
Shop Motor	300 watts
Soldering Iron	150 watts
Photographic Equipment	

There are a few other portable appliances which have not been itemized yet such as:

Vacuum Cleaner	200 watts
Fans	2—60 watts
Floor Waxer	200 watts

You will realize that I have carefully avoided mentioning lights at all. Lamps must be handled as a separate unit of planning and must be designed to fulfill their purpose.

In the kitchen a ceiling light is almost a necessity, and by all means use some method of diffusing the light's rays. Nothing is so hard on the eyes as a bare incandescent light. The ceiling light should be supplemented by additional lamps located at the main working centers such as the sink, range, work table and desk.

For the laundry a ceiling light is again almost a necessity, and should follow the same qualifications as for the kitchen. Supplementary lighting is also advisable, particularly at the ironer, ironing board, sewing machine and sorting table. Daylight lamps are preferred throughout this room in order to detect spots and scorches more easily.

The dining room is lighted mainly for decorative purposes. Valence lighting would be used at the picture window and cove lighting would be used on both side walls. The dining table will be bathed in a soft light emanating from a ceiling pinhole spotlight projector.

The living room is also lighted for decorative purposes as far as the fixed lighting is concerned. Most modern homes do not employ the ceiling light in the living room, but resort to cove and window valence lighting as in this case. Portable lamps are relied upon for lighting in such activities as reading, sewing and card playing. Avoid sharp contrasts in lighting while engaged in these various activities for less eyestrain.

In the bathroom the mirrors are flanked by fluorescent fixtures offering a B or C level of light. Do not try to struggle along on a single bare bulb over the mirror. Nothing makes shaving or the proper application of makeup more difficult than this one source of light. The shower and tub are equipped with dual lighting fixtures combining an ultra-violet lamp and an incandescent lamp in ceiling recessed vapor proof boxes. The ultra-violet lamps guarantee an amount of indoor sunshine even on the cloudiest day. A ceiling light here is optional.

For the bedrooms we again resort to the ceiling fixture supplemented by portable lamps to suit the varied activities. All of the closets are equipped with automatic door switches which turn on the closet

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Trends In Automobile Design

By C. Phillip Bowne, sr., m.e.

All cuts courtesy of Automotive and Aviation Industries

While industry is attempting to solve its labor, management, and production problems, let us view with an expectant eye the possibilities of various design trends in the automobile of the near future. With due consideration given to the necessary qualities of performance, economy of operation, initial cost, streamlined body design features, size, and weight, factors influencing design will be discussed as representative of those anticipated by our leading automobile engineers.

Perhaps of primary interest is the heart of the automobile, the power plant. It is felt that the trend here is toward a lighter and lower engine with a higher compression ratio and at no increase in cost. This will mean improved fuels with higher octane ratings and more complete fuel consumption. At the immediate present it is impossible to predict when octane rating will begin to ascend. Because of a shortage of lead and higher cost of production, fuels may have a somewhat lower octane rating with a maximum of around 80. When the fuels and lead become more abundant, however, we will see an increase in octane number.

Higher pressures produced in the cylinder call for tronger metals, and a reduction of engine weight per horsepower developed indicate the substitution of considerably lighter metals and a more economical utilization of materials in engine construction. But it seems that cost is the retarding factor in the substitution of lighter metals for iron and steel since these latter metals can be processed for half the cost of lighter metals with present methods. Today aluminum is favored over other light metals for such uses as pistons, heads, blocks, rocker arm brackets and bearings. Widespread use of light metals awaits, then, lower costs of production by improved metallurgical processes.

The reciprocating type of engine presenting the least height would be the horizontal opposed type with an F-head thought of as being "thin" and flat. Higher compression ratios and increased pressures combined produce greater bending forces on the crankshaft with the probability of a more noisy engine and greater wear and tear on the crankshaft and crankshaft bearings. The horizontal opposed engine would better absorb the bending forces and would tend to dampen out the resultant crankshaft noise-producing vibrations more effectively than would the vertical in-line engine so commonly used today. It is anticipated that automobiles in the lower priced field will attempt to gain the smoothness of power flow of a six cylinder car with the economy of a four cylinder opposed type. The number of cylinders naturally can be expected to increase with the more costly cars. It is believed that the ratio of engine displacement to car weight will remain about the same, although piston stroke may become shorter than the bore diameter. The proposed F-head would have the intake valves in the cylinder head actuated by rocker arms and the exhaust valves placed between cylinder bores with the exhaust ports inverted and extending toward the bottom of the engine. The spark plug could then be placed over the exhaust port to produce progressive combustion from hot regions to colder. Cylinder heads of this design are said to offer compactness, maximum valve size, maximum useful compression ratios, and a higher degree of anti-detonation. (See Figs. 1A, 1B, and 2).

Engine speed is directly linked with transmissions. Of course the ultimate limit to be obtained in transmissions is one which will approach an efficiency of transmitting all the power developed by the engine. In direct relationship with this limit is the elimination of the gear shift and the development of a purely automatic power shift; or, essentially, a system which will constantly cause the load to absorb the maximum power developed without power loss. The answer to this will be an infinitely variable transmission. En-

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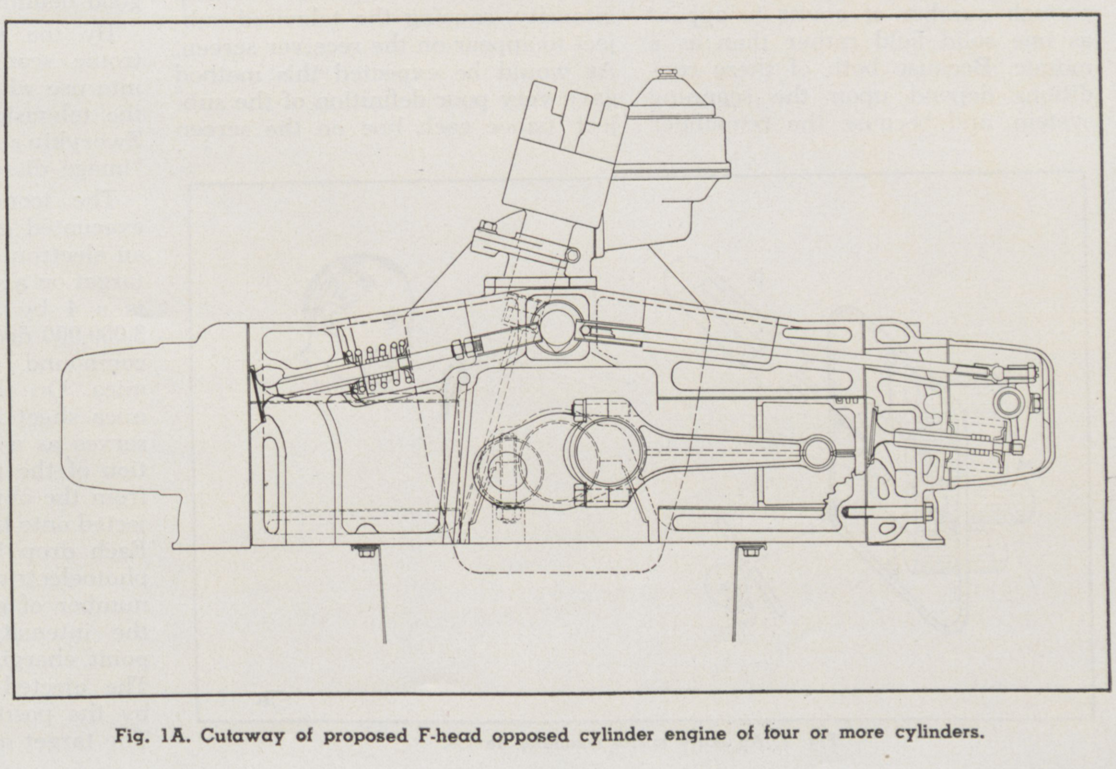


Fig. 1A. Cutaway of proposed F-head opposed cylinder engine of four or more cylinders.

The Heart of Television

By Charles Bashe, sr., e.e.

In the developmental history of television since the beginning of the twentieth century, one thing stands out above all others: that the greatest problem encountered by inventors in the construction of a satisfactory television transmitter has been the problem of scanning.

Scanning may be defined as exploring in some manner either the scene to be televised or an image of it, and recording electrically the amount of light reflected from each point on the scene. The resulting electrial variations are used to modulate the amplitude of a high frequency carrier wave which is transmitted as an ordinary radio signal. The television receiver consists, essentially, of a light beam which scans a screen in exact synchrony with the original exploring beam in the transmitter, and whose intensity is modulated by the variations in amplitude of the received carrier wave.

It can be seen that such a system will cause the original scene to appear on the screen of the receiver, *provided* the scanning occurs so rapidly that a whole field or scene is projected on the screen in a period of time shorter than the persistence of human vision; and *provided* the scene is broken up into a large enough number of points to appear as one solid field rather than as a mosaic. Because both of these conditions depend upon the scanning system, and because the remainder of the transmitter is little more than a conventional radio transmitter with high band-pass amplifiers, the scanning device may well be considered the heart of television.

At the turn of the century nearly all experimental television sets used the perforated disc, with which most of us are familiar, for scanning. Briefly, the operation of the system is as follows. A powerful lamp is placed behind a rapidly rotating disc, perforated so that the holes form one complete turn of a spiral starting near the center of the disc and working toward the edge. If the lamp is properly located, and the light beam through only one of the holes is allowed to reach the subject at any time, the latter will be scanned by a series of horizontal light traces, each of which is slightly lower than the preceding trace. A photoelectric cell is placed so that the light reflected from the subject is allowed to fall upon it, producing in the cell a varying current, always proportional to the amount of reflected light. The signal from the photoelectric cell modulates the transmitted carrier wave, and is detected by the receiving set, which contains the same rotating disc and lamp arrangement. The received signal is allowed to regulate the lamp intensity, causing the televised subject to appear on the receiver screen. As would be expected this method gave very poor definition of the subject (since each line on the screen was as wide as the light beam) and the problem of maintaining synchronization between the discs in the transmitter and receiver was almost insuperable.

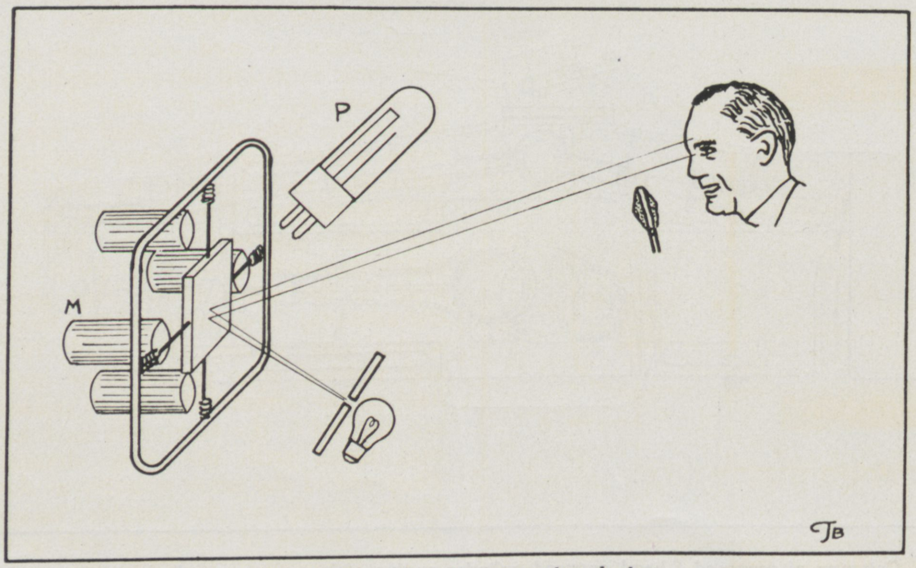


Fig. 1. An early mirror scanning device.

Surprising as it seems today, a few mechanical methods of scanning were still in use in the middle thirties. An interesting example is the oscillating mirror, Fig. 1, which was being employed by International Television. The mirror was mounted in such a way as to be mechanically resonant about both the horizontal and vertical axes. The electromagnets at M were furnished with current of the proper frequency to maintain the mirror in oscillation. A beam of light from an automobile headlamp was reflected from the mirror to the subject, and finally detected by the photoelectric cell P. Notice that in order to scan the subject properly the frequency of oscillation about the vertical axis of the mirror must be many times that about the horizontal axis. The receiver used a similar set-up, with the light beam modulated in intensity by the received signal. This method was a great improvement over the disc method, principally because the beam of light could conveniently be very narrow, giving good definition.

By the early thirties, two electronic scanning devices had come into use which were to revolutionize the television industry. These were Zworykin's iconoscope and the "image dissector" of Farnsworth.

The iconoscope (Fig. 2) is an evacuated glass envelope containing an electron gun and a photosensitive target on a signal plate P. The target is a 4 by 5 inch mosaic of about 3,000,000 droplets of a photosensitive compound upon a thin sheet of mica. On the opposite face of the mica sheet is a metal coating which serves as a signal plate. The operation of the tube is as follows. Light from the object being viewed is projected onto the photosensitive mosaic. Each drop in the mosaic acts as a photoelectric cell and discharges a number of electrons proportional to the intensity of the light at that point, charging the droplet positively. The ejected electrons are collected by the positive metallic coating M. The target may then be said to have on its surface an electronic picture of the object being viewed. A beam of electrons from the cathode K of the electron gun constantly scans the target in a series of horizontal sweeps from top to bottom, and each time the electrons strike a positive droplet the droplet is discharged. Because of the capacitance between the droplets and the signal plate, a pulse of current flows in the plate circuit each time one of the droplets is discharged. A resulting pulse of voltage is developed at A, and applied to the first video amplifier. It is obvious then that the same effect is obtained by scanning the target as was formerly obtained by scanning the subject itself. The scanning electron beam is controlled by horizontal and vertical deflection coils, shown at C, and of course can be made to move many times more rapidly than any beam of light deflected by mechanical means. The action of the mosaic in storing up electrical charge continuously between sweeps of the electron beam is called integrating, and adds greatly to the sensitivity of the iconoscope. The receiver used with the iconoscope will be described later.

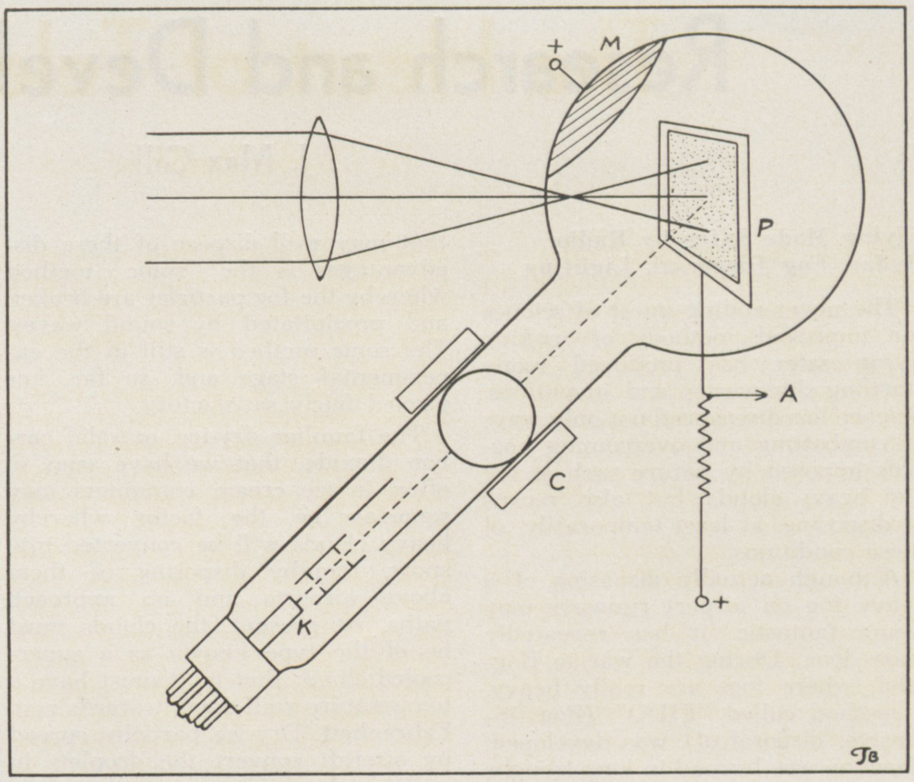


Fig. 2. The iconoscope was the earliest device in which an image, rather than the actual subject, was scanned.

The "image dissector" tube invented by P. T. Farnsworth is shown in Figure 3. Light from the subject is projected through the transparent cathode K and allowed to strike a photosensitive coating, as in the iconoscope. The ejected electrons are drawn to the positive anode A, forming an electron image throughout the plate-to-cathode space. Since these electron beams would tend to repel each other, a concentric electromagnetic focusing coil F is placed around the tube, making use of the fact that electrons tend to follow the lines of magnetic flux from cathode to plate. The entire electron image is rapidly deflected by horizontal and vertical deflection coils (not shown), so that the image scans the anode A in the same way that the target in the iconoscope was scanned by a single beam of electrons. One section of the image at a time is allowed to pass through a tiny square aperture in the anode and strike the first plate of the electron multiplier M. The multiplier is a relatively recent development using the principle of secondary emission. The plates of the multiplier are made of a metal such that when an electron strikes the first plate several electrons are knocked out of this plate and are attracted to the second plate, which is at a higher potential than the first. This process is repeated through several stages, each plate being somewhat more positive than the preceding one, until a current multiplication of 1000 or more is obtained. As in the iconoscope, the signal voltage is developed across a high resistance, and applied to the first video amplifier. Because of the electron multiplier used in the image dissector, the latter is inherently more sensitive than the iconoscope, and was probably the first television "camera" adapted to televising outdoor subjects. Either the iconoscope or the image dissector can be placed, together with the first stage of video amplification and the focusing lens, in a portable television camera.

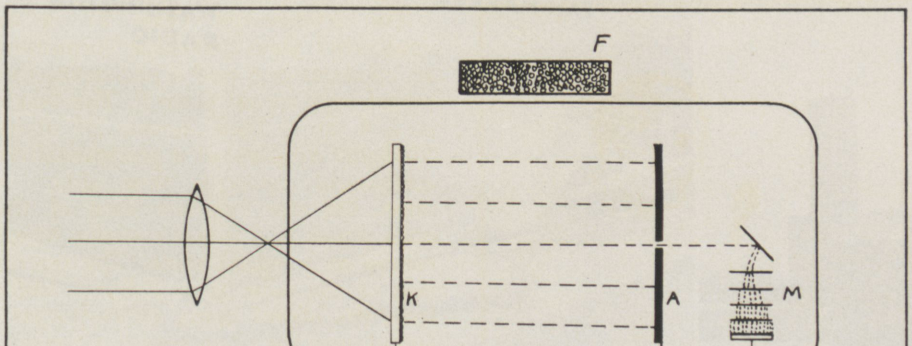


Fig. 3. Farnsworth's "image dissector" tube.

The receiver used with these all-electronic scanning devices employes a cathode-ray tube for reproducing the image. This tube, called a kinescope, contains an electron gun and deflection coils similar to those of the iconoscope. The electron beam scans the fluorescent tube face in exact synchronization with the scanning in the transmitter. This synchronization is maintained by horizontal sync pulses after each line and vertical sync pulses after each field on the screen. The synch pulses are applied to the carrier as modulation, along with the video signals. They are of the same polarity as the black signals on the carrier, being square pulses of much greater am-

(*Continued on Page* 30)

Research and Development

J. Max Gill

Flying Made Safer by Radio, Radar, Fog Dispersal, Lighting

The never-ending quest of science for improved methods of making flying safer has produced many startling discoveries and inventions. Science has discovered not only ways of combatting and overcoming hazards imposed by nature such as fog and heavy clouds, but, also, means of disposing, at least temporarily, of these conditions.

Although actually disposing of a heavy fog on airport runways may sound fantastic, it has repeatedly been done. During the war in England, where fogs are really heavy, a method called "FIDO" (Fog, intensive, disposal of) was developed. Gasoline was burned in long troughs along the edges of the runway. The heat produced was sufficient to disperse the fog long enough for a plane to land.

Later developments improved upon this system. Either gasoline or fuel oil runs through pipelines and is forced into jets where it is lighted by remote control from the control tower. This method provides better control and is more economical of fuel.

The greatest disadvantages of this method are the big expense of burning enough fuel to clear a large area and the fact that the intense heat creates thermal currents that buffet the plane severely. Another method that may well dispose of these disadvantages is the "sonic" method whereby the fog particles are broken and precipitated by sound waves. The sonic method is still in the experimental stage and, so far, has proved fairly satisfactory.

The familiar dry-ice, or solid carbon dioxide, that we have seen so often in ice cream containers may someday be the factor whereby heavy clouds will be converted into snow, thereby disposing of them above airports and on approach paths. At present, the clouds must be of the type known as a super-cooled cloud; that is, it must have a temperature well down towards zero Fahrenheit. Dry-ice particles spread by aircraft convert the droplets in such a cloud into snow that falls earthward, clearing the air. This method has been used successfully, although it is not yet ready for commercial usage.

Experts seem to agree that there is no single type of equipment now known that will meet all conditions of enabling a plane to land safely. Radar, high-frequency radio, glide beams, radio markers, runway lighting and fog and cloud dispersal all play a part, but none by itself appears to be sufficient.

Radar, though of tremendous importance, is not the cure-all for the hazards of civilian air transportation it was once hailed as being. War-developed radar was bulky, requiring considerable space and special crew members to operate. Civilian transports hesitate to install equipment whose weight and space requirements decrease payload capacity and, also, in using apparatus requiring specially trained personnel.

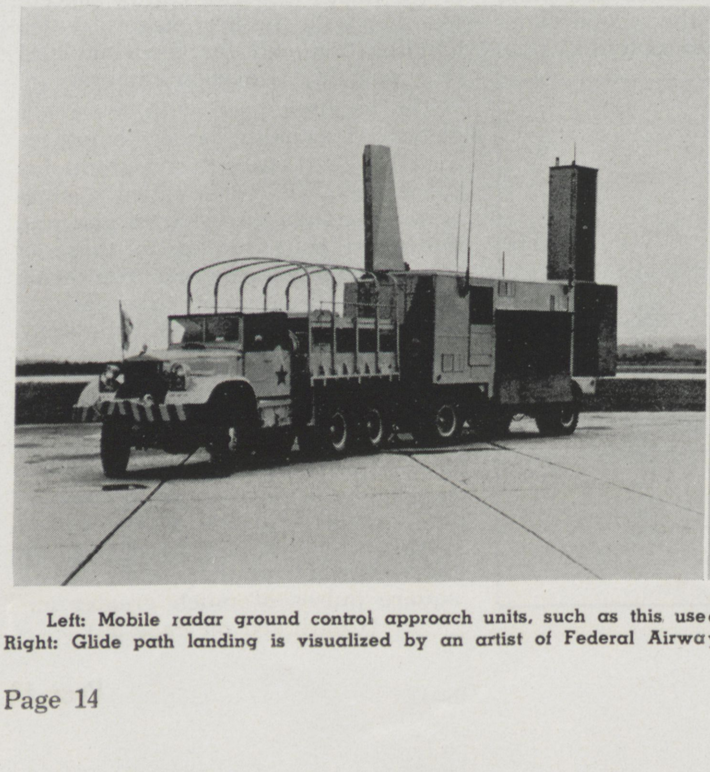
The CAA three-element instrument landing system is not radar. It includes a radio signal called a localizer which is picked up by a pilot when some 15 miles from an airport and used as a straight-line guide to the center of the runway. Also it includes a radio beam glide path which guides the pilot down a safe angle to the surface. The third element consists of two or more radio beacons with fanlike beams, projected vertically, which inform him of his nearness to the field.

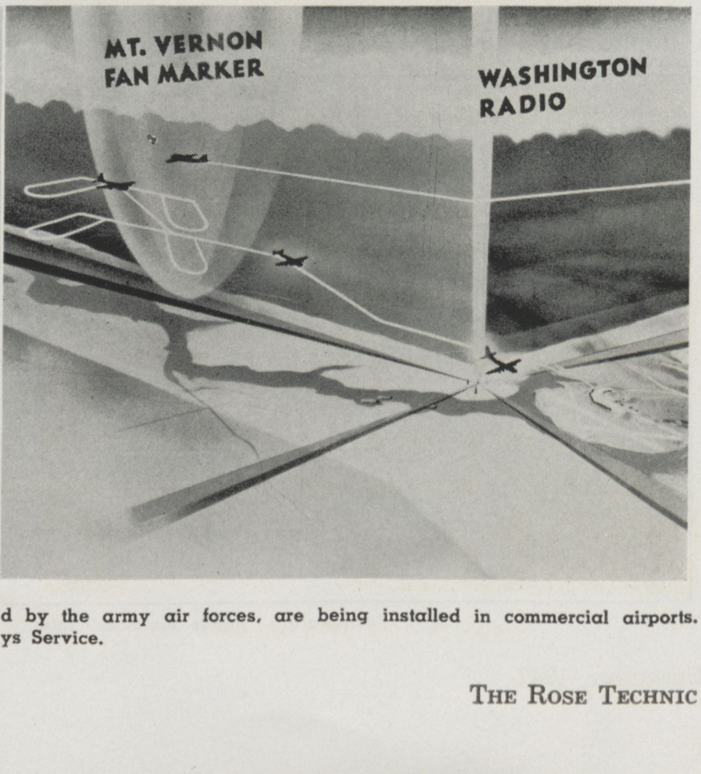
A new electronic device, an automatic pilot developed by the Sperry Gyroscope Co., guides the plane along the beam. The human pilot, however, is needed to set the device to receive the localized radio signals.

These methods, and other more familiar methods, are only a part of the contributions that science is making to bring about safe all-weather flying. As a result of these efforts, it may be said that the hazards of invisibility in aviation is rapidly being overcome.

Giant Roller Bearings

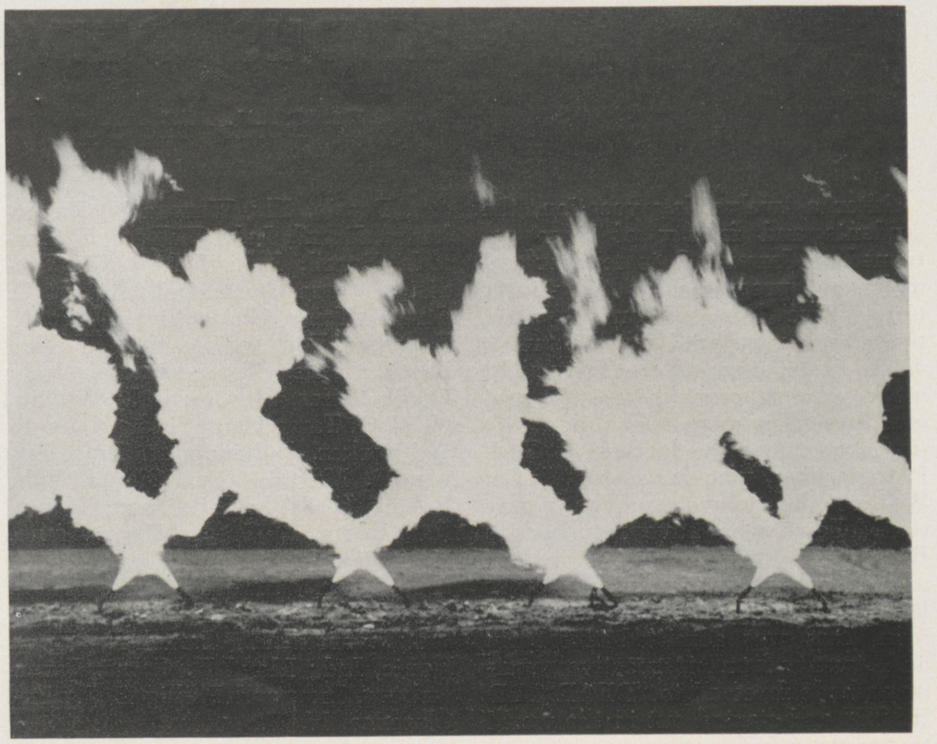
The fight against friction is a never





Left: Mobile radar ground control approach units, such as this used by the army air forces, are being installed in commercial airports. Right: Glide path landing is visualized by an artist of Federal Airways Service.

ending one. Research is continually developing new and better bearings to combat friction. These bearings vary in size from the tiniest ball-type bearings to giants such as those used in presses. One of the largest roller bearings is five feet in diameter. This bearing is used in giant rolling-mill presses in which the hot steel is rolled into finished sheets.



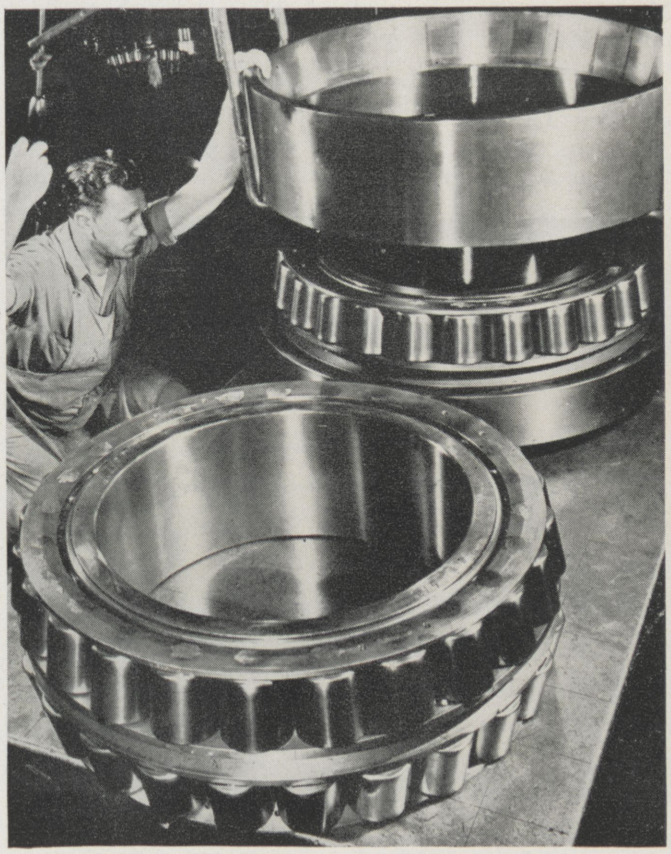
FIDO, above, makes runways safe for landings.

Design of New Telescope Nears Completion

The design is nearly completed of the world's second largest telescope. It is to have a 120-inch mirror and is to be located at the Lick Observatory of the University of California.

The designer, W. W. Baustian, has built a scale model one-sixteenth actual size of the telescope in order to solve a few of the problems that are expected to arise in the operation of the full-size instrument. The cost of the new telescope is estimated at $1,200,000, and it will take approximately four years to complete.

The new instrument will be unique in that it will be the first time that a fork type mount has been used on a large telescope. The tube which is to be 53 feet long and weight 35-tons, and the mirror which will be sixteen inches thick and weigh 8-tons will rest in a two-pronged 70-ton steel fork. The hollow fork can be rotated about its polar axis, while a second motor can be used to drive the tube and mirror. The advantage of such a mount is that the entire sky, except the area five degrees above the horizon, can be covered, without the need for the excess space and heavy counter-weights that are necessary in changing the position of other tubes.



Assembling huge roller bearings.

The telescope which has been designed along conservative lines, according to Dr. C. D. Shane, director of the Lick Observatory, will permit the installation of any type of auxiliary equipment that is usable on large telescopes. It will be possible to install the prime, Newtonian, Cassegrain and Cloude focuses.

The experience gained in the construction of the 200-inch telescope at Mount Palomar, the '00-inch mirror at Mount Wilson and other large telescopes has been put to good advantage in the design of this newest of the large instruments. The mirror will be of solid disk glass as advised by the Palomar designers. The use of solid dik glass permits easier grinding and polishing and greater freedom from banding than is obtainable with a sectional type glass.

The new mirror is expected to take astronomers 900,000,000 light years out into space, and will bring within visibility fainter stars and stellar systems that are beyond the reach of all but the Mount Palomar telescope. In order not to duplicate the work of the two telescopes, a co-operative program will be undertaken by the Lick and Palomar astronomers.

Nobel Prize Awards in Science for 1946

American scientists won all three of the Nobel prize awards in science for 1946. In the 46 year history of the awards this marks the second time that a country has made a clean sweep of the world's highest honors in physics, chemistry and medicine and physiology. Germany accomplished this feat in 1905.

Dr. P. W. Bridgman of Harvard University won the physics award for his enormous pressures. These pressures which were measured in millions of pounds per square inch approach the conditions prevailing in the inner most parts of the earth except for their low temperatures.

The Nobel prize in chemistry was

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Campus Survey

By Gordon Hayes,

After a twelve day vacation, the students and faculty of Rose returned on January 2, to register and make out programs for the winter term. Five hundred and twenty-three men registered for the term's work. Again many of the forty-eight states were represented as were several foreign countries. The man who probably comes the farthest is G. J. Rathinasamy, who hails from India. We are glad to welcome back several fellows who have returned to Rose after having served in the armed forces. Enrollment is not as large as it was last term as no freshman class was admitted this term and twenty-four prospective engineers bade farewell to "DEAR OLD ROSE" and started out in the world to try their hand at engineering.

Commencement

On December 21, 1946, Rose Polytechnic graduated its sixty-fourth class of engineers. The graduation exercises were held in the assembly room at Rose. The speaker for the event was Dr. C. E. Wildman, who is President of DePauw University. The members of the graduating class were: Edgar R. Carpenter, Indianapolis, Ind.; Robert M. Tiefel, Brazil, Ind.; Robert W. Leathers, Pittsburgh, Pa.; Theodore W. Blickwedel, Richmond, Ind.; Herman L. Shaw, Mokena, Ill.; Donald J. Kersten, Peoria, Ill.; Warren F. Haverkamp, Brazil, Ind.; William E. Barrick, Brazil, Ind.; Robert G. Bannister, Terre Haute, Ind.; Robert D. Strum, Terre Haute, Ind.; Jack A. Doerffler, Fort Wayne, Ind.; William R. McGlone, Terre Haute, Ind.; Frank Jones, Merom, Ind.; William M. Noel, Terre Haute, Ind.; Kenneth W. Barker, Indianapolis, Ind.; Edwin A. Martin, Terre Haute, Ind.; Robert L. Kylander, Terre Haute, Ind.; Robert A. Greger, Terre Haute, Ind.; Rex G. Herbert, Terre Haute, Ind.; Hugh W. Morris, Terre Haute, Ind.; Robert T. Penno, Indianapolis, Ind.; Harold E. Campbell, Terre Haute, Ind.; Lloyd H. Goble, Farmersburg, Ind.; and Phillip B. Loring, Clarence, N. Y.

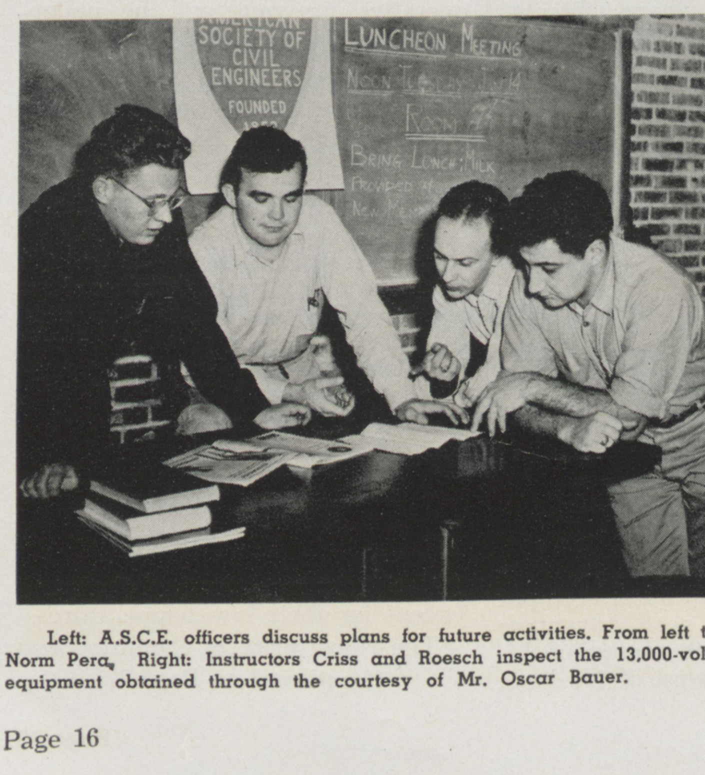
Dr. and Mrs. Donald B. Prentice of Wygenwood entertained with a reception from three until five o'-clock on Friday, December 20, 1946, at the Woman's Department Club for the graduating seniors and their families. Christmas greens and lighted red and white tapers were used as decorations throughout the clubhouse and on the tea table. Hostesses-at-large were Miss Mary Gilbert, Miss Helen Mahley, and Mrs. LeRoy Brown. Presiding at the tea table were Mrs. C. C. Knipmeyer, Mrs. Clarence Sousley, Mrs. Orion Stock, Mrs. Edward McLean, Mrs. B. A. Howlett, and Mrs. R. E. Hutchins. Assisting in the dining room were Mrs. Darrell Criss, Mrs. I. P. Hooper, Mrs. C. L. Mason, Mrs. James I. Mason, Mrs. John Newlin, Mrs. Theodore Palmer, Mrs. Otto Rhode, Mrs. Ralph N. Ross, Mrs. O. N. Knudsen, and Mrs. LeRoy Miller.

Rifle Club

The Rose Rifle Club has been reactivated this term under the direction of the military department. A meeting was held the first week of the new term and plans were made to write and get a charter from the National Rifle Association. Four meets have been announced for the near future. They are the University of Wisconsin on January 11, Carnegie Tech for January 17, the University of Pittsburg for January 25, and the Colorado School of Mines for February 16. Ten men are firing each meet with the scores of the top five men to be used. Sometime during the week preceeding the meet the members of the club fire their qualifying targets. This way the same ten men will not necessarily shoot all of the matches but all of the members will have a chance to get to shoot in every meet.

Radio Club

The radio club started the new term off with a meeting the first



Left: A.S.C.E. officers discuss plans for future activities. From left to right they are Richard Elstner, Ralph Mitchell, Tom Duwelins and Norm Pera. Right: Instructors Criss and Roesch inspect the 13,000-volt precipitron recently received by the school as part of the electronic equipment obtained through the courtesy of Mr. Oscar Bauer.

week of the term. Following this there is to be a meeting every Monday at twelve-thirty in room E. The first meeting was more or less to get things organized and to see who was and who wasn't there this term. At the second meeting nominations were received for the office of president. These will be voted on at the next meeting. James Alexander gave a short talk on the monthly meeting of the Wabash Valley Amateur Radio Association. All members were urged to attend these meetings if possible as everything that is done is of interest to the ham. The weekly meetings of the club are to consist of a short business meeting to be followed by a short talk or demonstration on some phase of radio work.

Instructors

Two new instructors began teaching at Rose the beginning of this term. One is Theodore Blickwedel who hails from Richmond, Ind. Mr. Blickwedel, who is twenty-three, graduated from Rose in December of '46 and received his degree in chemical engineering. He is now an assistant professor in the drawing department teaching engineering drawing. The other new professor is Charles Burton Butts who hails from Centralia, Ill. Mr. Butts, who is twenty-four, graduated from Rose in '43 and received his degree in electrical engineering. Following graduation, Mr. Butts went into the navy where he served until recently. Mr. Butts is in the physics department where he teaches physics lab.

Debate Club

The Debate Club is again being organized this term for the coming debate season. In the past seasons there has always been a debate team at Rose and they have always given a good account of themselves at debates. Again as in the past the club will have Reverend Brown as the faculty adviser. Reverend Brown in the past has proven to be a very good debate coach and we hope that the fellows will turn out for the club again this year.

Wrinkle, wrinkle, little face;
How you soon will lose your grace,
If your owner still with paint
Tries to make you what you ain't.

* * *

Our chemists wise,
It comes to pass,
Are making milk
From grain and grass,
But lovers of this fluid say
They still prefer the udder way!

Student Life

By Alex J. Vogl

Men, what did we ever do to deserve such a thing? Here we are, five hundred fifty prospective engineers, woman-haters all. And out of the clear skies our masculine campus is dotted with dozens of the unmentionable. I dare not name them, men; the whole thing is too horrible for words. Nay, leave us be brave and face the facts: there are women on Campus!! Isn't it wonderful? Our heartiest welcome, wives and families of Rose men—may your stay here be happy for you and fruitful for your husbands.

Latest addition to the Rose faculty, Mr. Theodore W. Blickwedel (Rose '46) has taken over his duties in the Drawing Department. Last December, before he had become *MR.* Blickwedel, Ted disclosed some weighty information regarding his future method of grading. It came about in No. 111, that well-known hole opposite the phone booth at Deming Hall. Room-mates Robert "Only-slept-fourteen-hours" Woody and Strong-Man Edwards, who were just launching their tactical campaign of the brown noses, are responsible for uncovering Ted's system. Any student who habitually addresses him as "Doctor" will receive straight "A"; "professor" will be worth "B"; "sir" will bring "C"; "mister" may get a "D", and anything less than that will considered as tempting fate. Freshmen and sophomores, take notice!

Three miles east of the campus there is a small, very tired looking farm. The barn is typically in better condition than the house—a perpetual puzzle to the city dweller but plain horse sense to the farmer. Inside this house lives not only the farmer and his family, but also a future engineer and his bride.

Showing how much he has learned in psychology class, Jim is starting Mrs. Fields off on hand-pumped water and outdoor plumbing (but definitely outdoor)! Now when the newly-wed's campus apartment is finally ready for them—possibly by the summer term, we understand—the Mrs. will feel as though she is moving into a luxurious mansion rather than a converted Army barracks. Let's call it, "Psychology at Work."

Our unofficial basketball team has been doing some mighty fine work for Dear Old Rose. John Bush, Jim Corban, Don Moore, George Brand, Walt George, Peewee Grant, and Paul Doorman have done most of the playing and most of the winning. Almost all have a good deal of high school experience behind them. Unable to practice in our gym, which had been doubling as a Veteran's Housing Unit, the hot-shots have

(*Continued on Page* 28)

A meeting of the student chapter of A.S.C.E.

Alumni News

By James A. Milner

You have probably seen Merrit Noel around the halls this past semester and have wondered how the school can possibly offer such a tough schedule to such old ancients as this alumnus who has returned to school. Merrit graduated from Rose with a mechanical engineering degree in 1939 and accepted a job with the Hamilton Foundry and Machine Company, Hamilton, Ohio, working for them until the following February. Merrit then went to work for the Central Illinois Public Service Company at Hutsonville Power Station. He served in the capacity of operator until July 1941, when he reported for duty as a second lieutenant in the Army Engineer Corps. William M. Noel served with the army until his discharge January 4th, 1946, and started his service for Mrs. Helen Noel the twenty-seventh of December, 1941. She was the former Miss Helen L. Larrance.

Matriculating in Rose for the second time he started in the electrical engineering course in January of last year and received his second diploma, in electrical engineering, this last graduation. Merrit is now engaged in working for the Standard Brands Co., Terre Haute, Ind., and in taking care of his relatively new son, Larrance Noel, born the first of September, 1946.

For your information I will reprint an article found in the Cincinnati Enquirer about Mr. Warren T. Reddish, Rose, 1913.

"Warren T. Reddish, former vice-president and operating manager of Emery Industries, Inc., died of a heart attack last night at the home of friends, Mr. and Mrs. Frank H. Wente, 3135 Epworth Ave., Westwood, the coroner's office reported.

Mr. Reddish, who was 55 years old, collapsed and died shortly after he returned with Mr. and Mrs. Wente from the Western Hills Country Club. He left Cincinnati in 1939 to become Executive Vice President of the W. C. Hardesty, Inc., New York. He retired last November. He had been staying with the Wentes on a visit to Cincinnati.

Mr. Reddish, who had lived in Wilbraham, Mass., a suburb of Springfield, since retiring, was a native of Indiana and a graduate of Rose Polytechnic Institute, Terre Haute, Ind. He came to Cincinnati in 1917.

A member of the Syrian Temple in Cincinnati, he was a 32nd degree Mason.

Surviving him are his widow, Mrs. Maomi Johnson Reddish; two sons, Warren T. Reddish, Jr., and C. W. Reddish both of Massachusetts, and two grandchildren.

'25 Martin E. Feldstein first association with Delco products came in 1925 after he was graduated from here as a mechanical engenier. In 11935 Mr. Feldstein was promoted to chief process engineer and in 1939 he became a master mechanic. He has been general superintendent of indirect manufacturing and was just recently appointed to manager of inspection and standards departments. He resides at 124 W. Beechwood Ave., Dayton, Ohio.

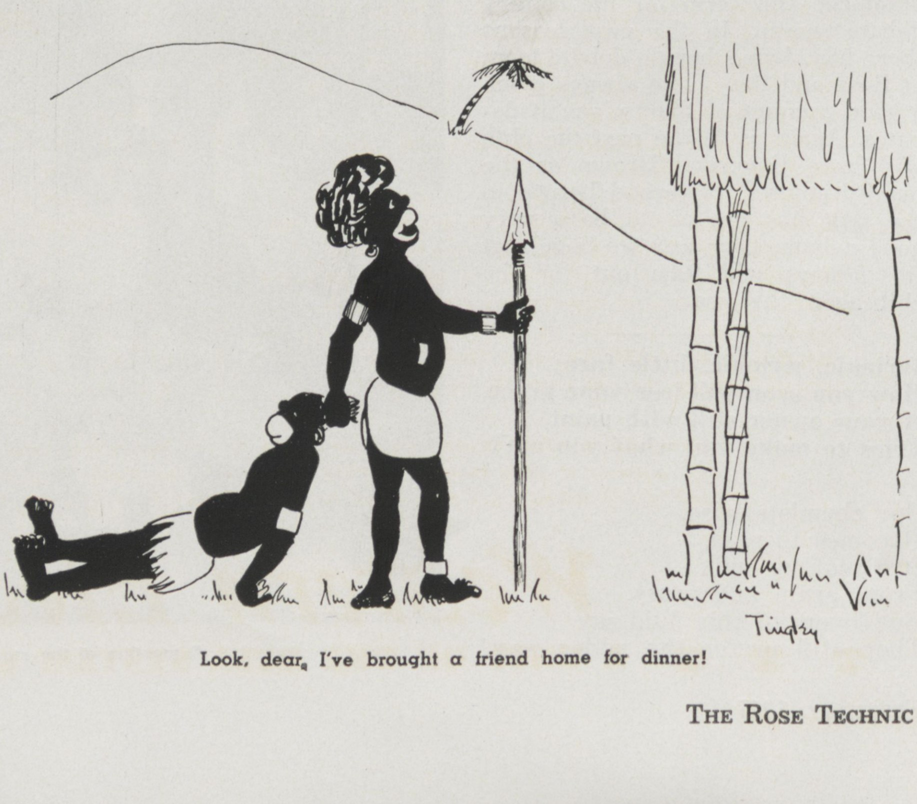
'34 Brent C. Jacob is now working for the Chrysler Corpn. in research design. His new address is 15766 Vaughan, Detroit 33, Mich.

'35 Harold Reintjes announces a son, Robert Carey, born December 9, 1946. He is working for the Corn Products Refining Co., Argo, Ill.

'41 J. Arnold Jones has just been appointed Vice-President and General Manager of Petroleum Sales for Everybody's Oil Corporation, Anderson, Ind. Mr. Jones was formerly Manager of Lubricants Research and Development for the Kendall Refining Company, Bradford, Penn.

'43 Mr. Richardson is an electrical engineer (Civil Service) in the Navy Dept., Washington, D. C.

Mr. Haas is working on his M.S. at the Mass. Inst. of Technology. He has been appointed an instructor in the department of Electrical Engineering.



Look, dear, I've brought a friend home for dinner!

Fraternity Notes

Theta Xi

Kappa Chapter is glad to see Frederick Pence, Ernest Frigo, Max Duggins, Norman Walls, and Franz Layer in school and back with us again.

On Saturday evening, January 11, we limbered up for the new term with a stag party at the fraternity house. Bob Penno, K-296, and Albert Klatte, K-232, represented the alumni. Dr. C. P. Sousley, Mr. G. K. Haist, and Mr. L. S. Miller of the faculty were guests.

During the past month there were several important events in the lives of Kappa members to whom congratulations are in order:

A daughter, Deborah Ann, was born to Archie and Jim Milner on January 9th. Archie and Deborah are doing nicely and Jim seems to have recuperated very well.

On Sunday, December 22, Miss Lorena Mace and Max Lindley were married at Centenary Church in Terre Haute. Members of the fraternity were among guests at a reception after the wedding.

As this copy goes to press announcement has been made of the forthcoming marriage of Miss Elizabeth Rose Lager and William Berling, the wedding to take place on Friday, January 17, in Indianapolis.

We wish the best of luck to Jack Norton, Eddie Valenzano, and Sherrill Arvin who left school this term. Jack Norton is in an investment business in Cincinnati and Eddie Valenzano transferred to Illinois Tech. Sherrill Arvin is packing up his boots and bright red tie and going back to Texas.

Sigma Nu

The House of Sigma Nu is still undergoing repairs and remodeling. Friday afternoon and especially on Saturdays the sounds of young men hard at work are prevalent. Some are removing old wall-paper, others are doing regular house work, and a few are removing sinks, gas pipes, partitions, and in general are changing the physical appearance of the house. Furnishings are coming in from the Mother's Club, and the active chapter bought a refrigerator and gas stove on January 10. Plans are also being made to finish a room in the basement for a recreation room.

After the remodeling is done we will have something in which we can very well take pride for all the work is being done by the chapter members themselves. The cooperation of each and every member has been far above that ever observed by your reporter. Our sincere thanks goes to the faculty and alumni members for their splendid co-operation in a time of need.

Another girl is now wearing the pin of Sigma Nu, Bill Cornell placed his pin on Rita Shikel on Christmas Eve.

We wish to welcome back to the list of regulars Bill Cornell, Ted Kadel, Bob Brown, and Wayne Walters all of whom entered Rose again with the beginning of the present term.

Lambda Chi Alpha

Theta Kappa Zeta of Lambda Chi Alpha is planning a roller skating party for the January social function. Arrangements for the party are being made by Social Chairman Phil Bowne, and a large attendance is expected.

Hell Week and initiations are being planned for the near future. The following men are to be initiated at this time: Robert Bitting, Loren Pittman, John Lichtenwalter, Bill Bannister, Bill King, and Richard Fairbrother.

The chapter has been attempting for some time to find a house suitable for a fraternity house. Several houses are in prospect, and it appears as though the chapter will have a house before many more weeks go by.

Alpha Tau Omega

Pledge Jack V. Plenge started the New Year by enlisting in the United States Army. We wish you luck, Jack, on your army career.

On January 6 Indiana Gamma Gamma held formal pledging ceremonies for these three men: John C. Bush of Gary, Ind.; Thomas G. Morris of Kalamazoo, Mich.; Karl V. Hauser of Litchfield, Ill.

These five pledges suffered hell week January 13-19: E. A. Deagan, Robert Brettell, Joe Boeckman, Paul Hill, and James Bowman.

At the present writing the chapter is rushing plans for two big affairs. The first one is a pledge dance to be held February 7. The other is the state dinner and dance on March 8. On the latter date Indiana Gamma Gamma is again proud to be host at this all-Provence XVII affair. ATO chapters from Purdue, Illinois, Indiana, Rose, and DePauw will be in attendance.

Tau Nu Tau

Recently the Rose chapter of the Tau Nu Tau Military Fraternity became active again. An election of officers resulted in William Berling being chosen as president, Francis Heinz as vice-president and Joe Bisch as secretary-treasurer.

Plans are already under way for the Military Ball which will be held on February 22nd in the Mayflower Room of the Terre Haute House. This affair will be formal and any former member of the armed forces may wear his uniform. The price of admission will be $3.60.

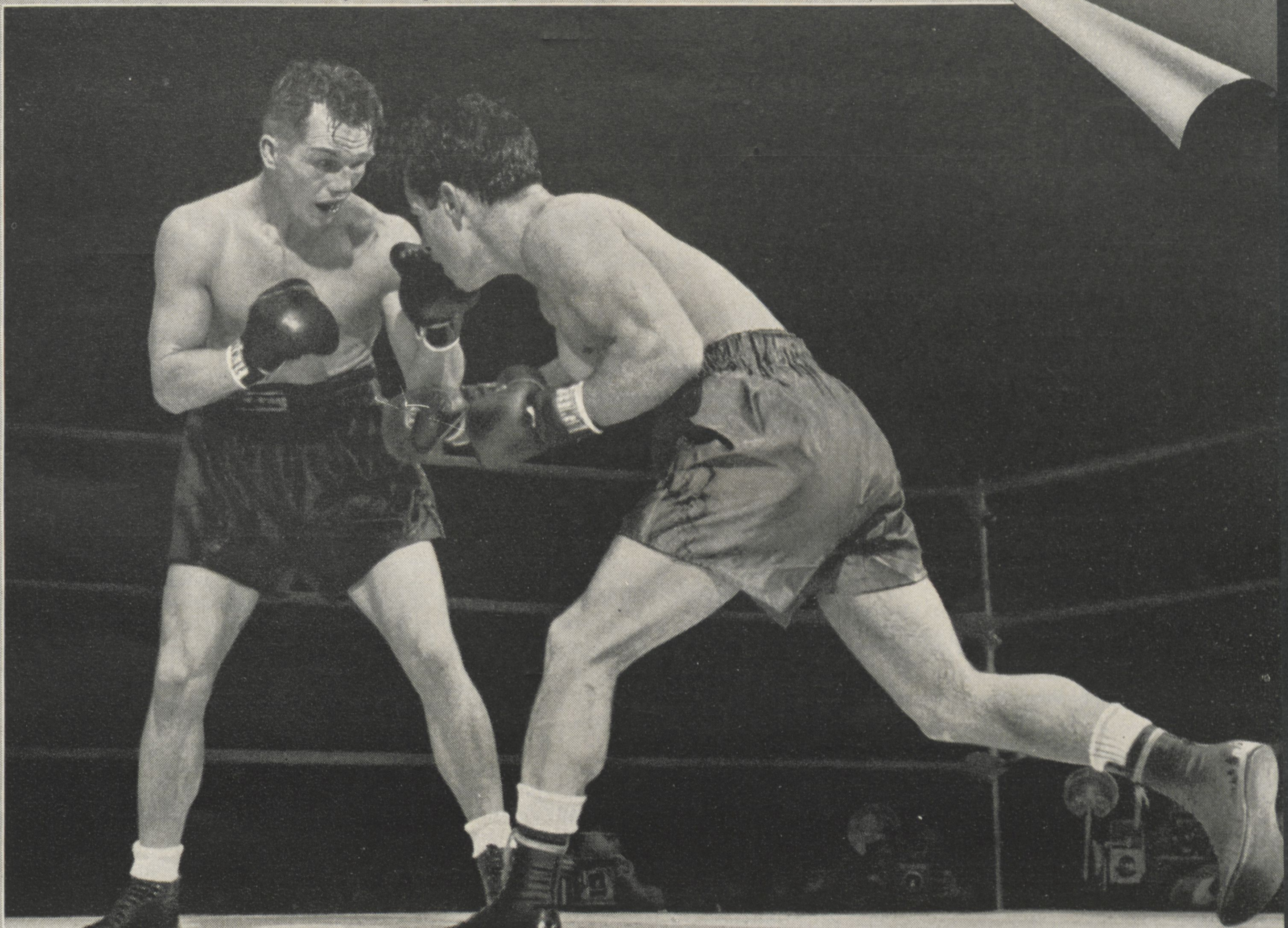
It is hoped that everyone will try to attend this first Military Ball since the war and make it a grand success. More details will be announced soon.

Tau Beta Pi

At the meeting of Tau Beta Pi on January 7, 1947, officers for the next term were designated as follows: Carl Wodicka, President; Herman Prust, Vice President; Bob Flack, Corresponding Secretary; Phil Bowne, Secretary-Treasurer. A banquet is being planned for student and faculty members, to take place in early February. Professor Herman Moench has been re-elected to act as faculty adviser of Tau Beta Pi.

Kodak

A TENSE MOMENT in the September, 1946, title bout between middleweight champion, Tony Zale (left), and top-ranking challenger, Rocky Graziano.



Because photography is graphic . . .

You know how photography brings out the drama and excitement of a prize fight. But do you know how it can be used to bring out the drama and excitement of ideas . . . products . . . processes . . . technics?

With motion pictures, you can put new life, spark, interest in the presentation of any idea or product. You have color, sound, and action . . . and can get quicker and greater acceptance through your showmanship.

The whys and wherefores of basic processes and technics can be graphically explained with films . . . training programs made more understandable, more interesting, and, therefore, more productive.

Beyond these, there are many other business and industrial uses to which other phases of photography can be applied. For a brief and interesting description of some of these uses, write for booklet—"Functional Photography." It is free, of course.

Eastman Kodak Company, Rochester 4, N. Y.

Functional Photography is advancing business and industrial technics

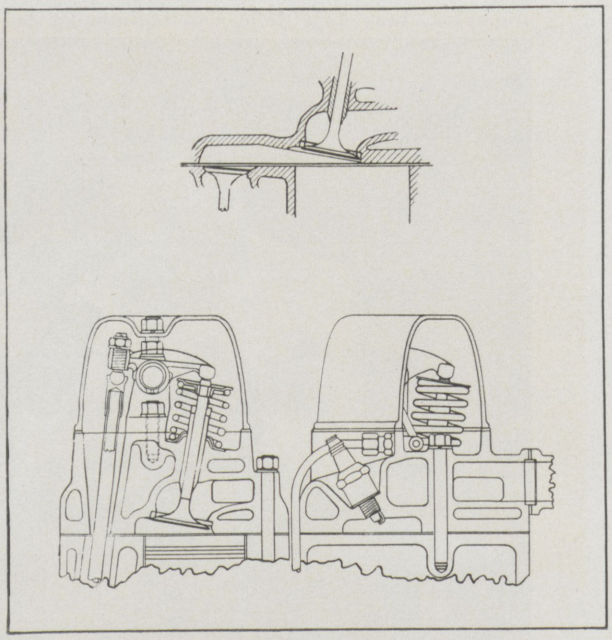


Fig. 2. Section of cylinder head.

AUTOMOBILE DESIGN

(*Continued from Page* 11)

gine speed and size would be reduced as greater economy would be had from the high load factor on the engine. Looking at it in a reversed power flow sense, i.e., from the point of application of load back through the transmission and to the engine, the engine would be called upon to develope only that power required to overcome the load. Therefore the driver's only control over the power flow of the engine would be through the accelerator and a lever for selecting forward or reverse. It is possible that complete hydraulic-drive systems will be developed and used giving an efficiency of about 99 per cent at faster car speeds and will present completely infinitely-variable transmission.

It is doubtful that many changes will take place in carburetion. Briefly they will be simplified carburetor construction requiring less manifold heat and placed in alignment with the intake manifold to gain better distribution of mixture to the cylinders, and improved and more widespread use of automatic chokes and accelerator-starter switches. A more equal and even distribution of air-fuel mixture can be obtained by using more carburetors. Mixture ratios may go up as high as 19.5 to 1. Fuel injection is being considered from the standpoint of better fuel economy, distribution and the possible use of lower octane fuel. At the present, however, it is too expensive.

The present goal set for cooling systems is a sealed pressurized system using a factory-installed year-around coolant which would aid in reducing both size and weight. It also seems more desirable to mount the radiator directly on the engine and eliminate flexible joints, thereby adding to the rigidity.

Along with higher compression ratios, greater explosion pressures, and automatic transmissions must come better bearing, hardened journals and better and non-corrosive lubricants. Bearings will probably be steel-backed copper-lead. Spark plugs must be designed to withstand higher pressures and be less apt to become fouled by waste deposits.

Body design trends seem to indi-

(*Continued on Page* 28)

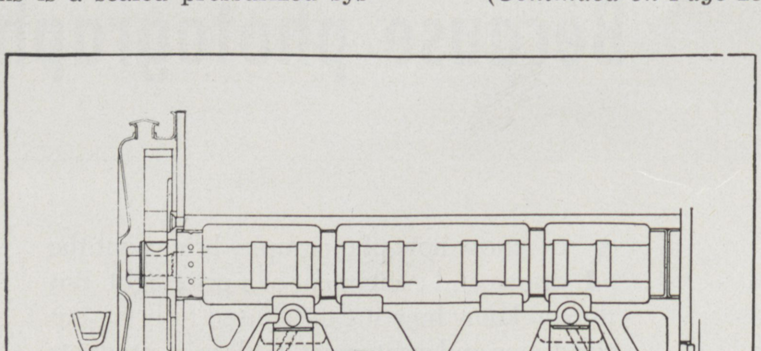


Fig. 1B. End view of the F-head engine.

No moisture can seep through the seams of these raincoats—thanks to the electronic sewing machine developed at RCA Laboratories.

A sewing machine...without a needle or thread!

Since mankind first began to sew, say 15,000 years ago, seams have always meant "needle and thread."

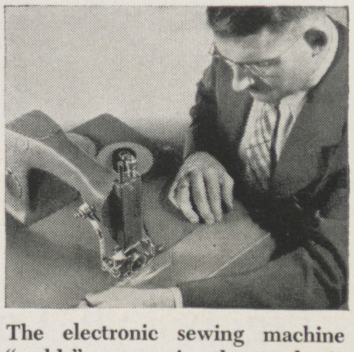
But when new thermoplastic materials came along—specially developed for waterproof coverings such as raincoats—ordinary "needle and thread" seams wouldn't do because of their tiny holes.

Now—thanks to research at RCA Laboratories—goods made of thermoplastics are "sewn" by electrons and the seams are as strong as the material itself!

This will make possible dozens of brand-new uses for these inexpensive and durable thermoplastic materials. Even today they provide perfect packages for foods, meats and drugs because they are completely watertight, airtight and transparent. You've probably seen thermoplastic raincoats, tobacco pouches, shower curtains . . .

Research, such as resulted in the electronic sewing machine, is reflected in all RCA products. When you buy an RCA Victor radio or television receiver or anything bearing the name RCA, you enjoy a unique pride of ownership in knowing that you possess one of the finest instruments of its kind that science has yet achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P.M., Eastern Time, over the NBC Network.



The electronic sewing machine "welds" seams in thermoplastic materials. Anyone interested in manufacturing this instrument can obtain information by simply writing to RCA, RCA Building, Radio City, New York 20, N. Y.

RCA

RADIO CORPORATION of AMERICA

CHEMICALS FROM THE SEA

(*Continued from Page* 7)

hydrous magnesium chloride to produce magnesium and by-product chlorine.

In operation it works in the following way:

The water is pumped from Freeport Bay at 250,000 gallons per minute, screened, and sent to the plant through a large flume. Oyster shells, dredged from Galveston Bay and brought to the plant by barge, are washed in a rotary screen and conveyed to the rotary kiln in which the are burned to a high purity calcium oxide. This lime is conveyed from the kiln to the rotary slakers, from which it emerges as a thick slurry.

The lime slurry is concentrated to a heavy sludge in a 150 foot Dorr thickener. This sludge is drawn from the thickener, and is pumped into a flocculating tank where it meets the sea water. Careful pH adjustment is required for precipitation of the magnesium hydroxide.

The magnesium hyroxide floc-sea water suspension is then pumped into four 200 foot Dorr thickeners. The resulting sludge is filtered in huge 90 foot filters, each consisting of 100 canvas covered leaves. The filter cake is removed, mixed with magnesium chloride brine, and pumped to the neutralizing unit where it is reconverted into magnesium chloride by treatment with hydrochloric acid.

The solution of magnesium chloride is concentrated in direct-fired cylindrical furnaces, and dehydrated in shelf and rotary driers. The anhydrous magnesium chloride is introduced into the electroltic cells, each of which holds approximately 10 tons of molten salts. In the electrolysis, 5 tons of fused salt yield about 1 ton of magnesium. The molten magnesium rises to the top of the cell bath, is dipped off, and poured into pigs of 99.9% purity.

Thus, with the successful extraction of bromine and magnesium, the vast potentialities of sea water are just being realized—potentialities limited only by the economic profitability of processes involved.

"Without laboratories men of science are soldiers without arms"—LOUIS PASTEUR

Why some things get better all the time

THE SPAN OF LIFE is increasing. Within the last half century the average length of life of a new born infant has increased over 30%. And many more people over 40 can now expect to live well into their seventies.

Among the reasons for this progress, along with notable advancements made by the medical profession, are the improvements in medicinals and medical equipment that help guard life.

Synthetic organic chemicals now are used in the production of a host of pharmaceuticals, including penicillin and the sulfa drugs, which have accomplished wonders in the fight against germs. They also are used in repellents to defeat disease-carrying insects. Out of research with gases has come oxygen therapy, an aid to recovery in numerous illnesses. Research with metals and alloys has produced the gleaming, easy-to-clean stainless steel used in modern hospital and medical equipment.

In safeguarding life—just as in transportation and communications—much of man's progress is traceable to *better materials.*

Producing better materials for the use of industry and the benefit of mankind is the work of UNION CARBIDE.

Basic knowledge and persistent research are required, particularly in the fields of science and engineering. Working with extremes of heat and cold—frequently as high as 6000° or as low as 300° below zero, Fahrenheit—and with vacuums and great pressures, Units of UCC now separate or combine nearly one-half of the many elements of the earth.

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30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

Products of Divisions and Units include

LINDE OXYGEN • PREST-O-LITE ACETYLENE • PYROFAX GAS • BAKELITE, KRENE, AND VINYLITE PLASTICS
ACHESON ELECTRODES • EVEREADY FLASHLIGHTS AND BATTERIES • NATIONAL CARBONS
PRESTONE AND TREK ANTI-FREEZES • ELECTROMET ALLOYS AND METALS • HAYNES STELLITE ALLOYS • SYNTHETIC ORGANIC CHEMICALS

HOME APPLIANCES

(*Continued from Page* 10)

is a fascinating game that will pay off in concrete dividends.

There are several reasons why each of you should plan your own electrical service. First, the contractor or architect who is going to design my new cousin is not a mind reader. Usually in planning the nervous system for the new comer to my family, the best that the contractor or architect can do is to plan an average electrical system based on the floor area of the new Home. All too often this method fails to offer the desired facilities, for every light when the door is opened.

In the basement be sure that the stairs are well lighted and again avoid the use of a bare incandescent lamp. For the utility section, the placement of lights is optional, but the locations should be such that frequent work areas are well lighted with at least an E level of light.

You will notice that in all of the rooms there are wall switches just inside the doors controlling some general lighting fixture. Rooms having more than one entry have multiple switch control for convenience and safety. Outdoor lighting must be considered also, however, in this case, I have confined myself to outside lighting directly connected with the house at the front and back entry.

The next step in planning our electrical wiring is to determine the types and number of circuits that will be needed to supply the electrical equipment described. Before we are able to do this, however, it will be necessary to learn what types of circuits are available. There are three basic types:

1. General Purpose circuits
2. Appliance circuits
3. Individual Equipment circuits

The general purpose circuits are designed to handle all of the general lighting and small portable appliances. Each circuit of this type will handle up to 1,725 watts; however, no fixed appliances with the total rating of 690 watts or single portable appliance with an individual rating of more than 1,150 watts should be used on this type of circuit.

The appliance circuits are designed to serve all plug-in outlets in the kitchen, laundry, dining room, breakfast room, utility room and garage. Appliances only are to be used on this type of circuit—no lighting. Each circuit will deliver 2,300 watts, however, any single appliance with a 1,725 watt rating should not be used on this circuit.

The individual equipment circuits are for use in serving only single appliances or single equipment units rated above 1,725 watts. These circuits may be either of the two or three wire type delivering 115 or 230 volts respectively.

Now we are ready to locate these circuits on the floor plan. Let us start with the kitchen again and first of all determine how many individual circuits will be needed. The electric range will need an individual circuit, and although the roaster's rating does not exceed 1,725 watts, it would be advisable to supply it with an individual circuit. Hence for the kitchen two individual circuits will be needed.

How many appliance circuits will be needed? Now a little common sense will help considerably. The remaining appliances have a total wattage consumption of 3,728 watts. Since none of these appliances exceed 1,725 watts, it would stand to reason that all of the remaining appliances could be served by two additional appliance circuits. We might place the dishwasher, garbage disposer unit and refrigerator on one circuit and allow two spare outlets to serve any of the other portable appliances.

Of course the toaster and coffee maker could be placed on this circuit which would make the total power drawn appear to be 2,900 watts, but common sense tells us that very rarely would all five appliances be operating at the same time. Therefore, the circuit would still be considered safe.

The second appliance circuit could have seven outlets to accommodate the remaining portable appliances. Two of the outlets would be placed in the dining room to enable these appliances to be used there without necessitating an additional appliance circuit. The fan, clock and bactericidal lamp, although considered appliances, will be connected to the lighting or general purpose circuit in order to save some wire length.

All of the lights, the fan, clock, and bactericidal lamp may be placed on one general purpose circuit since the total wattage will approximate only 300 watts.

This completes the wiring for the kitchen and looking back over our plans we will find that this room will require five circuits—two of the individual circuit type, two appliance circuits and one general purpose circuit.

Next we will turn our attention to the laundry, and here we will need three individual circuits to

(*Continued on Page* 30)

RESEARCH

(*Continued from Page* 15)

shared by three scientists. Drs. W. M. Stanley and J. H. Northrop, colleagues in the Rockefeller Institute laboratories at Princeton, shared half the prize. Dr. Stanley showed that the filterable viruses that causes such plant diseases as tobacco mosaic and aster yellows are not living organisms like ordinary bacteria, but non-living crystallizable proteins with huge and complex molecules that in many respects behave as if they were alive.

Dr. Northrop's most notable work has been in the field of enzymes, the chemical reagents that make digestion, respiration, and other vital processes possible. Last fall he announced the discovery of a mother substance of all proteins. This substance he called proteinogen.

The other half of the prize in chemistry has been awarded to Dr. J. B. Sumner of Cornell University. Dr. Sumner was the first scientist to crystallize an enzyme. In 1926 he prepared crystalline urease. This enzyme is important in the nitrogen cycle in nature. He crystallized the enzyme, catalase, in 1937, which protects the living cells against the hydrogen peroxide they form in their own respiratory processes.

Dr. Hermann J. Muller of Indiana University received the Nobel prize for medicine and physiology. Dr. Muller is famous for his investigations and discoveries relative to the effects of radioactive radiation upon mutation in living things.

Infra-Red Night-Seeing Equipment

Germany has been the leading nation in the development of infra-red equipment for war purposes. Their equipment was bulky and heavy but more efficient than that of other nations. One of their more important devices were image-forming detectors for night vision.

This device sent out invisible beams of infra-red rays which were reflected back to the receiver by any object in their path. The reflected rays were converted to a visible image in the receiver. This instrument is similiar to the American sniperscope and snooperscope, but the German instrument had a range of 328 yards or more than five times the range of its American counterpart.

The German instrument used cesium-silver oxide. This may have been copied from an American development. In 1936 scientists of the Radio Corporation of America developed an electronic tube, using cesium, which enabled its user to view a limited field illuminated by infra-red rays only.

Another development enabled the Germans to "see" heated objects such as tanks, aircraft and ship motors. All heated bodies give off infra-red rays which are the principal heat waves given off by radiation from a heated body. Some of the German instruments were image forming and some were not. These instruments were used to detect aircraft as far away as twelve miles. To do this an infra-red telescope was used. Variable potentiomenters were provided to aid in focussing. With this device objects having no higher radiation than the boiling point of water could be detected.

STUDENT LIFE

(*Continued from Page* 17)

been doing most of their practicing at the Y.M.C.A., and playing games at the Armory and elsewhere about town. While this team is neither sponsored nor coached by the school, it does reflect credit on the spirit and ability of Rose students. The players have no incentive of fame or reward; they play for the sake of the game alone—a case of true sportsmanship.

AUTOMOBILE DESIGN

(*Continued from Page* 22)

cate a departure from the present profile to smoother air flow characteristics, clear all-around vision, and the absolute disappearance of fenders and running boards. As the center of gravity is being lowered, the body is being spread out to offer more space and riding comfort within. Body suspension systems point to some form of torsionaction members, each acting independently of the others.

The second twin was named Encore because he wasn't on the original program.

* * *

Everytime a self-made man opens his mouth he puts his feats in it.

* * *

The old believe everything; the middle-aged suspect everything; the young know everything.

HOME APPLIANCES

(*Continued from Page* 26)

serve the water heater, the drier and the ironer respectively. The total power consumption of the remaining appliances will approximate 2,800 watts; hence two appliance circuits would be indicated. One of these circuits would serve the automatic washer and hand iron permitting two spare outlets for other portable appliances. The second appliance circuit might serve the hot plate, the sewing machine and also permit two spare appliance outltts, one of which will be reserved for the bathroom heater.

Once again the exhaust fan, clock and bactericidal lamps will be used on the general purpose circuit for convenience sake. The total load on this general purpose circuit will not exceed 500 watts so that a single circuit will be able to handle both the kitchen and laundry demands. This accounts for five more circuits in our complete network.

The remainder of the house is served by small appliances and lighting facilities; therefore, additional appliance circuits and individual circuits need not be considered. Be sure, however, to allow sufficient circuits for plenty of lighting, exterior as well as interior. For a house of this size, six additional general purpose circuits should prove enough to offer adequate facilities.

This just about completes our experiment in planning the electrical circuits for your Home. A few other items that might be considered desirable, however, are a signal system for the front and back door, and by all means install a system which will identify at which entrance the caller is located. Many a tiring step may be saved by supplementing the signal system with an intercommunication network. This permits the busy housewife to find out who is calling without having to leave her work. Telephone extensions within the house are also very helpful. Locate them in the more frequented rooms of your Home—kitchen, study and master bedroom.

An electrical net work as complete as this will enable us to offer you a continuous and satisfactory electrical service. Start now and plan the electrical service that you will need, and remember that you may attain better living through electrical living.

'Bye now.

TELEVISION SCANNING

(*Continued from Page* 13)

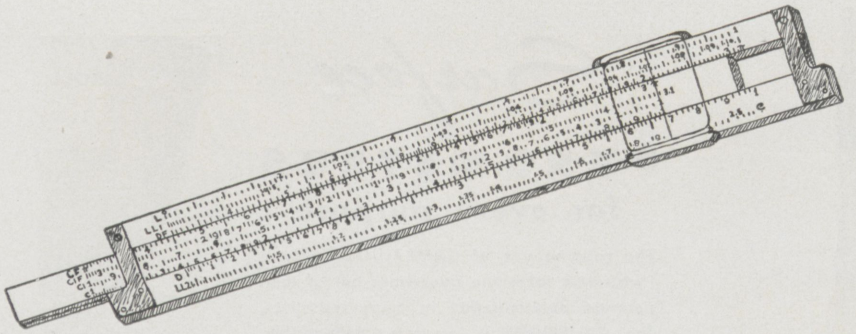
plitude than any of the video signals. At the end of each horizontal sweep these "blacker than black" pulses trigger off a gas discharge tube in the horizontal sweep circuit, causing the scanning spot to fly back to the left, then allowing the current in the horizontal deflection coils to build up again, and the spot to scan from left to right. Similarly, after each complete field on the fluorescent screen, the spot flies to the top left of the screen and repeats the scanning process. The intensity of the electron beam, and therefore the intensity of flourescence at each point on the screen, is controlled by the video signal applied to the grid of the cathode-ray tube. In this manner the entire image is reproduced on the screen.

At present, electronic scanning devices are used in all television transmitters and receivers. Their two chief advantages over mechanical devices are the ease with which synchronization can be maintained, and excellent definition due to the enormous number of lines into which the image can be broken.

Recent developments in the scanning field include the orthicon (an improved iconoscope) and color television. Until quite recently, color television was accomplished by a rotating three-color disc placed before the viewing screen in the receiver. RCA has just announced, however, the development of an all-electronic color television system, although the details of operation are not yet available.

Electric Love

If she wants a date—Meter.
If she comes to call—Receiver.
If she wants an escort—Conductor.
If you think she is picking your pocket—Detector.
If she's slow at comprehension—Accelerator.
If she goes up in the air—Condenser.
If she's hungry—Feeder.
If she's a poor cook—Discharger.
If she eats too much—Rectifier.
If her hands are cold—Heater.
If she fumes and sputters—Insulator.
If she wants a holiday—Transmitter.
If she is narrow in her views—Amplifier.
If she is a pest—Exterminator.



Sly Droolings

By Robert W. Wolf, jr., e.e.

Harriet: "When Frank grumbled that you did not give him any encouragement, what did you say?"

Mabel: "Why, I told him I preferred a man who didn't need any."

* * *

First Co-ed: "Jimmy is grand, but I think all men are trying sometimes."

Second Co-ed: "All the time, dearie, all the time."

* * *

"Big boy, you're like a locomotive when you hold me this way."

"You mean I puff and wheeze?"

"No, I mean you're on the right track."

* * *

My girl's teeth are like stars—they come out at night.

* * *

Heard in power recitation:

Instructor: "What is the advantage of a long pump handle?"

Student: "You can get somebody to help you pump."

* * *

He answered all her silly questions, but he had grown tired and for the past half hour he had been trying to get some sleep.

Wife: "George, dear, is everything shut up for the night?"

Hubby (yawning): "Everything else, dear."

* * *

A newly married couple on a honeymoon put up at a sky-scraper hotel. The bridegroom felt indisposed and the bride said she would slip out and do a little shopping. In due time she returned and tripped blithely up to her room, a little awed by the number of doors that looked alike. But she was sure of her own and tapped gently on the panel.

"I'm back, honey! Let me in!" she whispered. No answer.

"Honey, honey! It's Mabel. Let me in!"

There was silence for several seconds. Then a man's voice, cold and full of dignity, came from the other side of the door.

"Madam, this is not a beehive, it's a bathroom."

When a girl starts wearing low neck dresses, you can bet she is trying to show her heart's in the right place.

* * *

Although any man can have a wife, only the ice man has his pick.

* * *

She used to be a school teacher, but she has no class now.

* * *

She: "I drove my ball clear out of sight."

He: "Did it go into the woods?"

She: "No."

He: "Here's another ball then."

* * *

"Damn," said the ram, as he hurtled over the cliff, "I didn't see that U-turn."

* * *

The proof of this page is in the wastebasket.

* * *

Ode to a Slide Rule

Women are babbling all the time,
Of dates, and drinks, and dresses,
Which wouldn't help at all when I'm
Computing strains and stresses.
My slip-stick conquers without a doubt,
Whole hosts of sines and surds,
And helps me work in peace without
An avalanche of words.
Slide rules are always accurate,
Women never so;
And though they're not affectionate
They never answer, "No!"
So hence with women's wanton ways,
With eyebrows, lips and curls.
My little log-log polyphase
Is worth a dozen girls.

* * *

Mother: "Son, I don't want to see you going around with that wild girl any more."

Son: "Aw, heck, maw, she ain't wild. Anybody can pet her."

* * *

Society Dame: "James, you are the slowest chauffeur I ever had."

James: "I'm naturally a bashful man, ma'am."

And when a girl is as fit as a fiddle, every man in town wants to be her beau.

* * *

Mary had a little lamb, but who cares when they can see her calf?

* * *

The belle of the village had just been awarded a loving cup as the winner of the popularity contest. The presentation was made by the mayor, who was a wisecracking old rascal, and with a wink at the crowd, he asked what made her so popular with all the boys. The shy beauty considered the question for a few seconds, and then smiled coyly.

"I give up," she said.

* * *

"There's a patient in my ward who hasn't made love to me yet."

"One of mine is still unconscious, too."

* * *

"So you've learned to love me?"

"Yes, I've been watching how all the other boys do it."

* * *

A proud local parent called up the newspaper and reported the birth of twins. The girl at the news desk didn't quite catch the message over the telephone.

"Girl: "Will you please repeat that?"

Parent: "Not if I can help it."

* * *

Newlywed: "I married a girl with a twin sister."

Bachelor: "How can you tell them apart?"

Newlywed: "I don't bother; the other one has to look out for herself."

* * *

A Poet to His Love

Would that I were a shining star
That I might view you from afar
But no, I'm just a mortal man
And I can see your ugly pan.

* * *

Coed in local store: "I want a new corset."

Clerk: "What bust?"

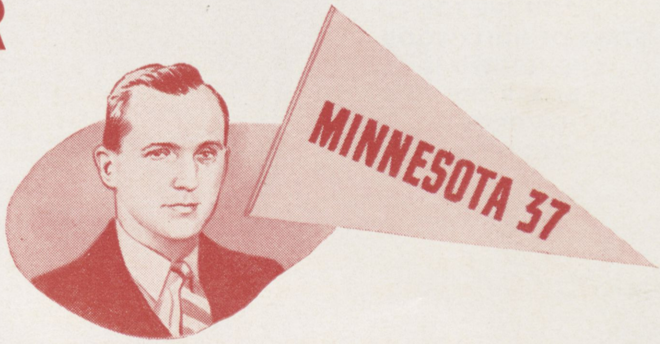
Coed: "Oh nothing, it just wore out."

Campus to GENERAL ELECTRIC

ELECTRONICS ENGINEER

The Story of

DICK LONGFELLOW



NO small factor in Dick Longfellow's decision to come with General Electric was the knowledge that at G.E. he could continue his studies in electronics engineering.

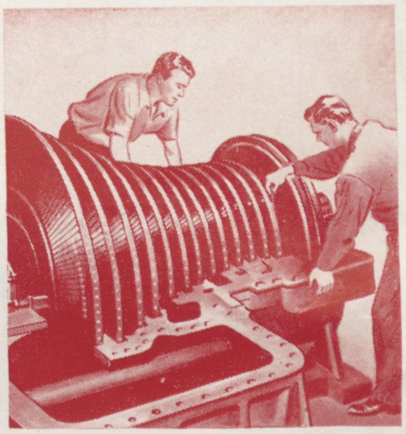
Dick had grown up with electronics. He had operated his own amateur radio station when he was 14. At Minnesota he had specialized in communications and had worked as an operator and engineer for the University Broadcasting station. He had found time for extra-curricular work in installing and operating audio equipment.

With this background of intensive study, Dick was well-prepared to take advantage of the courses available to him at General Electric. After a year on "Test" he enrolled in the company's advanced engineering course, then followed this with two more years of high-frequency studies. By his outstanding work in these courses he was able to win electronics assignments first, in the Research Laboratory, and later, in 1940, with the Transmitter Division.

Since then Dick Longfellow has been shaping for himself the kind of a career he began planning years ago. He has worked in television, has designed ultra high frequency radio tubes, has contributed to the development of radar. And today, after ten years with G.E., he is Chief Engineer of the Electronics Specialty Division, responsible for the development of a range of devices that extends from electronic hot-dog venders to radio sonde equipment for the Army and Navy.

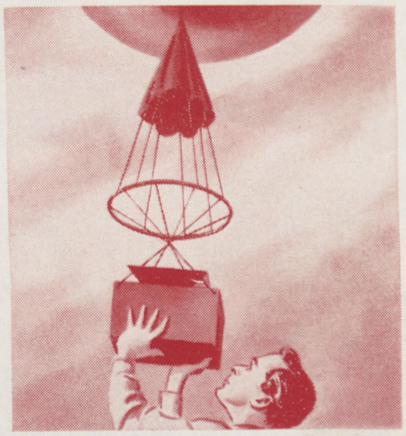
Next to schools and the U.S. Government, General Electric employs more college engineering graduates than any other organization.

At Minnesota, Dick worked as an engineer for the University broadcasting station, handling controls during football broadcasts.



One of his early jobs with General Electric was the testing of turbines. He continued his engineering studies by taking G-E courses.

Assigned to radar work, he helped design G-E equipment for both the Army and Navy, including the giant microwave early-warning radar sets used in the later stages of the war.



Engineer of the Electronics Specialty Division, Dick now directs the development of such devices as the radio sonde equipment shown above, used to determine weather data.

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